THE IRON AGE

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A New Iron and Steel Jobbing Warehouse

Convenience in Handling and Storing Material at the Roehm & Davison House, Detroit—Vertical Bar Storage Along Aisles

A new iron and steel jobbing warehouse that is well arranged for convenience both in handling and in storing material has recently been built by Roehm & Davison, Detroit, Mich. The building is a brick and steel structure 213 ft. long and 155 ft. wide. It is divided into two main sections. The rear section forms a large bay, which is used for the storage of structural material and large-sized bars. This section is 75 x 213 ft., and is covered by a steel trussed roof. The entire bay is served by a Toledo Bridge & Crane Company's 10-ton electric traveling crane having a 75-ft. span. The adjoining section, extending the length of the building along the east front side, is used for the storage of sheets and light bars. Spaced 15 ft. each way in this section are columns of 14-in. I-beams. This part is divided into three sections, measuring 60 x 80 ft. each, by two 15-ft. aisles that extend back to the crane bay. Five 15-ft. transverse aisles run through this section from the two main aisles, and in the center of each of these cross aisles is a 5-ft. cement floor. One of the illustrations shows one of the cross aisles with bars stacked up on each side. The accompanying drawing shows the floor plan of the warehouse and the arrangement of the aisles.

Between the columns, 11 ft. above the floor, used for the storage of small-sized bars, are 12-in. beams, framed horizontally into the 14-in. columns, and to add to the strength of the construction a 7-in. beam is placed in a vertical position against the lower web of the 12-in. beam. This provides a rigid construction of sufficient strength to hold up as large a stock of bars as can be stacked vertically. A view of the type of construction is shown in one of the accompanying photographs taken in the sheet storage department. The 15-ft. main aisles have cement floors for their full width, and these aisles extend back through the crane bay to the rear of the building, forming a passageway for hand trucks from the front

View of the Crane Bay for the Storage of Structural and Other Heavy Material Showing Freight Cars on the Inclosed Siding and the Bar Storage Arrangement at the Right

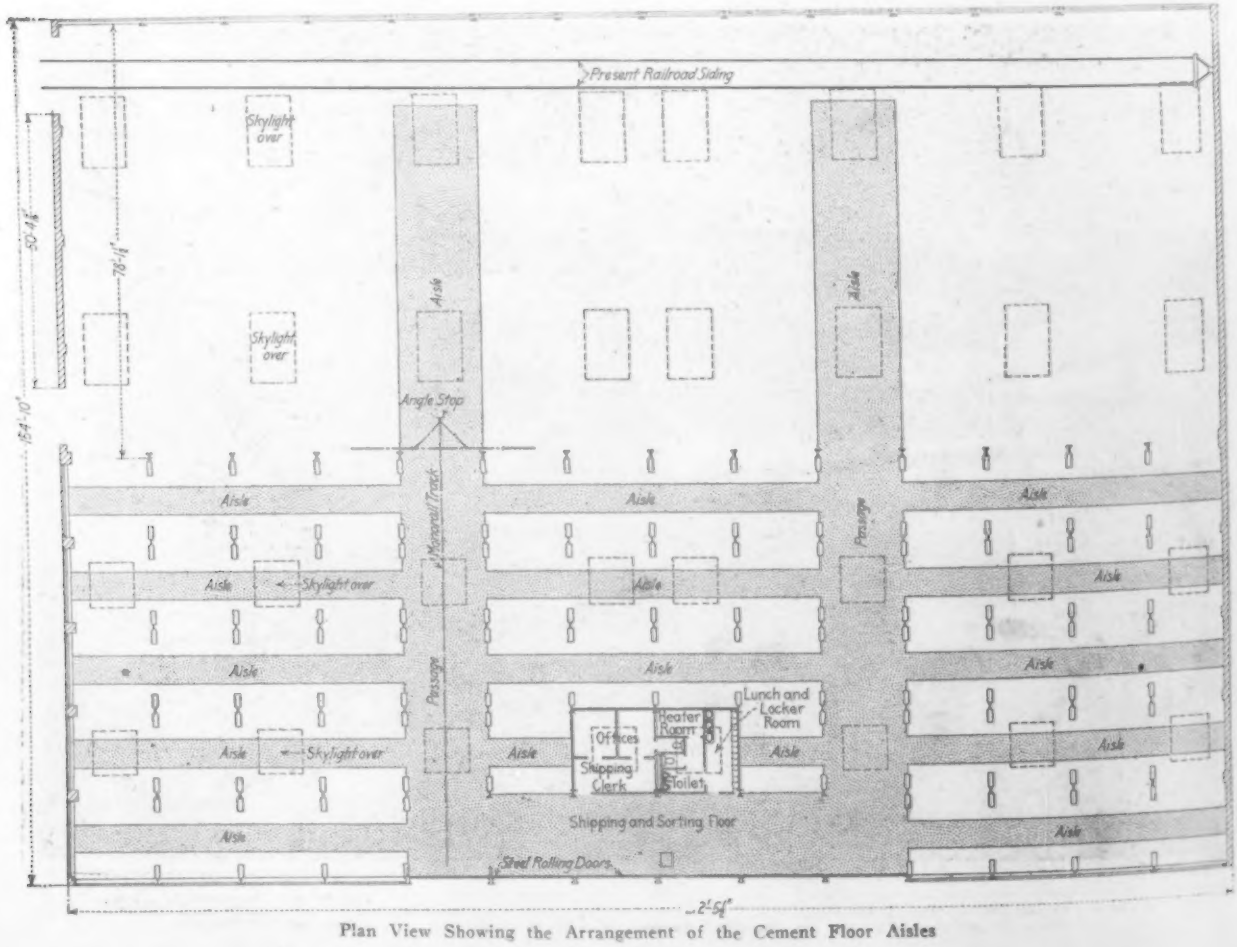
One of the Main Passageways Served by an Electric Monorail Hoist

to the rear of the building. A railroad siding enters the south end of the crane bay close to the rear or west wall, and a track extends the length of this bay, providing an unloading space for six cars at one time. No material is stored outside of the building, and all unloading from cars and loading on trucks is done under cover. Cars are unloaded with the traveling crane, which places the stock in its storage space in the crane bay. Sheets and smaller sizes of bars are unloaded with the crane and placed on hand trucks, by which they are taken to the front section of the building, where one side is used for sheet storage and the other for the bars. Motor trucks are backed down the north main aisle to the crane floor, and material for city delivery is loaded directly on these trucks with the traveling crane. Three motor trucks with capacities of 5, 3 and 1½ tons are used for this purpose. The south main aisle adjoining the bar storage section is served by a 5-ton electric monorail hoist furnished by the Northern Engineering Works, Detroit, Mich.

At the front of the building, but not partitioned off, is a shipping and sorting room, 15 x 90 ft., with a cement floor. A 9-ft. canopy extends over the front of this section of the building, so that outside loading can be done without exposure to the weather. The front adjacent to the shipping room is inclosed with six Kinnear rolling steel doors. The floors in the aisles and shipping room were designed for hard wear. The floors are composed of 4 in. of concrete on 6 in. of cinders, and on the concrete is laid a topping 1 in. in thickness furnished by the Master Builders Company. No flooring is provided throughout the warehouse with the exception of the aisles and shipping room. Stock in the crane bay is laid on wooden blocks for convenience in handling with the crane.

Back of the shipping room is a small warehouse office inclosed by a steel sash with glass in the upper sections and Toncan metal below. The only wood used throughout the building is the office floor and a door leading from the office to a toilet room.

An abundance of outside light is provided by continuous windows in Fenestra steel sash that extends the length of the west side of the crane bay from 11 ft. above the floor to the roof and in the east side in the space from the adjoining roof up the crane bay roof. The greater



Plan View Showing the Arrangement of the Cement Floor Aisles

portion of the bar and sheet department is provided with windows and steel sash extending from a similar distance above the floor to the roof. Additional light is also provided by 16 skylights over the crane bay and 16 over the aisles in the other section.

The trussed roof of the crane bay is 36 ft. 6 in. in hight at its peak, with a 3-ft. pitch. The roof of the front section is 23 ft., 5 in. in hight at its peak, with a 3-ft. pitch. Cement tile roofing is used.

The warehouse is equipped with a shear furnished by Jos. T. Ryerson & Son, capable of cutting a 24-in. beam in 45 sec., driven by a 35-hp. motor and fed by an air compressor operated by a 2-hp. motor, a Cleveland Punch & Shear Works Company punch and shear with a 7-in. throw and a Cochrane-Bly Co. saw with a capacity for cutting 7-in. round stock.

Plans for the warehouse were prepared by Smith Hinchman & Grylls, architects and engineers, Detroit.

One of the Transverse Aisles in the Steel Bar Storage Section

Working of State Compensation in Ohio

An interesting analysis of accidents occurring in Ohio was made by the Ohio State Liability Board of Awards, which made a final report recently before becoming merged with the Industrial Commission of the State. The causes of 10,000 injuries are given as follows: From belts, 107 cases; eye injuries, 1220; gears, 132; presses, 286; saws, 302; hot metal, 311; nails, stepped on, 162; flying chips, 746; hit by emery wheels and dust, 548; by falling objects, 992; by vehicles, 120; falls from ladders, scaffolds, buildings, wagons, cars, piles, poles, into excavations, vats and shafts, 328; slipping and stumbling, 321; dropping handle objects and handling heavy objects, 1354; trucking, 162, and tools, 851. There were 1220 eye injuries, which cost the State insurance fund in excess of $23,000.

Thirty-five-cent goggles would have prevented virtually every one of these eye injuries, and could have been purchased for $427. The injuries from hot metals were occasioned in almost every instance by molten metal running into the shoes of the workmen. Had jeans trousers and special shoes been worn, less than half of these injuries would have occurred and the other half would have been reduced greatly in seriousness. It is remarkable that the 162 injuries caused by stepping on nails resulted in not a single case of lockjaw. However, these cases cost the State insurance fund more than $1000. The bursting of emery wheels cost 102 injuries and two deaths. An iron protector in such a case would have held these wheels. More than 50 falls from ladders could have been prevented by simple spikes or shoes to prevent slipping. The 229 injuries caused by belts, flying wheels, pulleys and shafting, and embracing four deaths, could have been prevented by guide rails and wire mesh.

Of the working of the State plans, the report says in part: "We are able to point with certainty to two great results to be achieved: The reduction of the question of workmen's compensation insurance to the question of distribution rather than to one of added burden, and the certain result of a reduction in the number of accidents. The system of rate making, adopted by the board, considers two elements of hazard, the inherent element and its variation caused by the employer. The basic rate considers the inherent element and the penalization considers the variation; hence, the board offers a tremendous inducement to reduce the hazard, namely, the reduction in cost for so doing. There are numerous instances already where employers have diminished the number of accidents, expending their money for that purpose once and for all, and saved of the necessity of doing so hereafter."

View in the Bay Used for Storing Steel Sheets

The Chicago, Duluth & Georgian Bay Transit Company, Chicago, Ill., has awarded a contract to the Great Lakes Engineering Works, Detroit, Mich., for the construction of a new passenger steamer. The vessel will be 316 ft. long, 47 ft. beam, and will be equipped with a quadruple expansion engine and three Scotch boilers.

Planning for Commerce via Panama Canal

South American and European Activity—Home Interests Quietly at Work—Traffic Diversion from Other Routes

BY CHARLES M. PEPPER

[Mr. Pepper, who recently resigned as foreign trade expert of the State Department at Washington after eight years' service, is spending several months in studying developments in the trade of the United States likely to follow the opening of the Panama Canal. The present article is the first of a series he will prepare for the columns of *The Iron Age*. For three years previous to his connection with the State Department he traveled in many countries, submitting reports and monographs of an economic and commercial character to the Department of Commerce. He has had much to do with trade negotiations with South American countries and one of his investigations brought out the more recent developments in the project for a Pan-American railroad. Mr. Pepper is the author of "From Panama to Patagonia," a book which deals with commercial and social conditions in South Ameican and Central American countries.—EDITOR.]

PANAMA, OCTOBER 8, 1913.—Getting ready for the operation of the Canal seems a simple process. Everything moves so evenly that the finishing touches of the construction excite no comment. To the onlooker there would seem much yet to be done, but the Canal officials know better. They speak of that which remains to be done in a casual way. To them it is all very simple. The steam shovels have about done their work. The dredges have labors yet ahead, and will continue; but the great engineering work is practically completed and the details of letting in the water are all that remain.

Range Light Tower

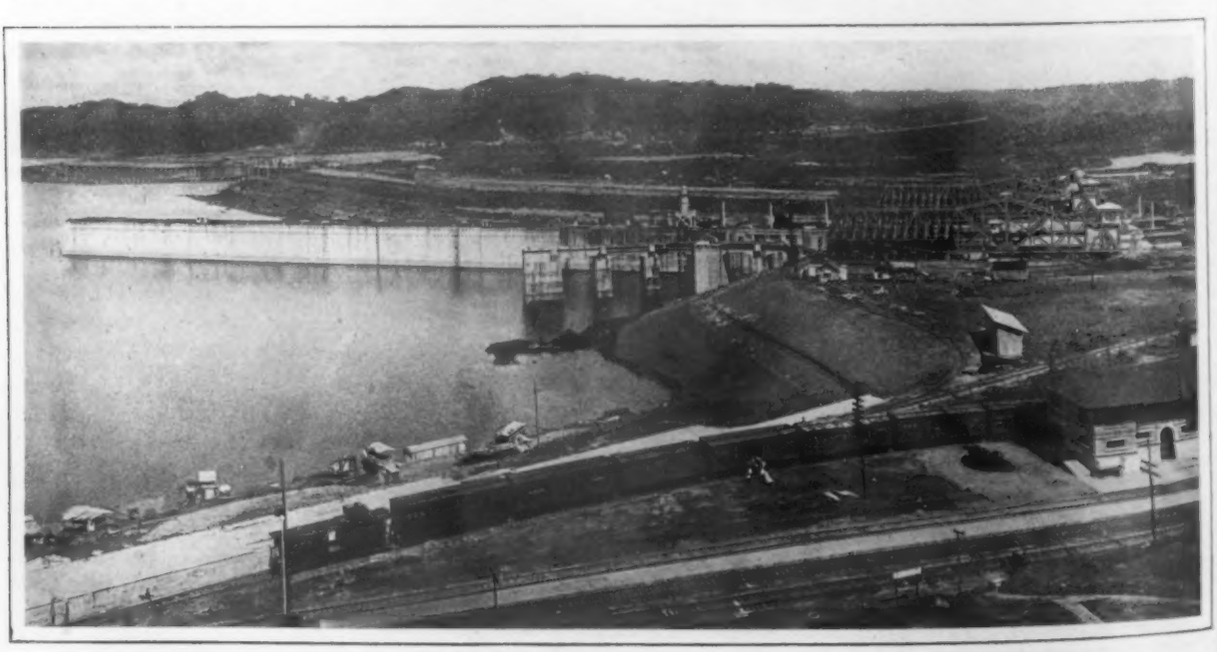
Colonel Goethals remarked the other day: "After the water is all in, the Americans who come down to Panama and see just the Canal will wonder where all the millions of dollars have gone." He is probably mistaken on this point, because there are enough of the visible engineering monuments that will remain. I went the other day over the Gatun dam works with Colonel Sibert and Major Hoffman. Everything was about completed. The waters in Gatun Lake were then up 65 ft. Colonel Sibert explained that if the rainfall this season had been normal, the waters would be up to the top of the spillway. However, they have not been normal, and there was a small margin, but the levee was finished. No doubts exist as to the ability of the Gatun dam to hold back the impounded waters of the Chagres and its tributaries. The Chagres valley with the ridge uniting the hills on either side is already the huge reservoir which was planned. Colonel Sibert incidentally pointed out where the old French canal would have crossed the Chagres, and then explained how the floating islands, or masses of vegetation which now dot the surface of Gatun lake, would be let over the spillway and carried out to sea by the Chagres.

The three levels of the Gatun locks show up clearly in the rows of lamp standards, range lights, towers and beacons. The massive gate moving machinery is also one of the visible engineering monuments, as are the emergency dams and other protective devices. What is true of Gatun is also true of the locks at Pedro Miguel and Miraflores. So it may be assumed that the Americans that come down to Panama will not agree with Colonel Goethals, and will feel that they see where some of the millions have gone. When they go through the Culebra Cut they are pretty sure to understand it better.

The simplest thing about the Canal as it appears to-day is the modest central control house at Gatun. The details of the plans for the electrical towing of the vessels through the locks and the operation of the lock machinery are to-day the chief features of interest in relation with the untried plans of operation. The central control station is a very simple structure, but it is ample for its purpose.

The Canal in Its Military Aspects

Very little has been printed about the plans for the actual operation of the Canal, possibly because to Colonel



General View of Upper Locks, Gatun, from Water Tower, Showing Center Approach Wall and, in the Distance, the Gatun Dam and Spillway

Goethals and his associates there seems to be so little out of the ordinary. But inquiry discloses that, while the Canal is dedicated to the uses of commerce, it is essentially a military proposition. In addition to the decision of Congress that the Canal should be fortified, it is impossible to get away from the military background. The harbors at Colon and at Balboa were planned to meet the wishes of the navy. The dry docks and anchorage at Balboa have been planned in the same manner.

It is the expressed opinion of one of the highest of the Canal officials that one year in a century the Canal may be the field of military operations. That being so, it has not been assumed that the year of war might not come until the end of the century. Instead it is assumed that the year of war may come any time after the Canal is in operation. This being understood, the naval and military features may be dismissed except as they have incidental bearing on the Canal as a commercial waterway. In this sense the permanent works are of special interest. These permanent works have not advanced as rapidly as the Canal itself, because there was no need of them. But already the bay of Limon is practically converted into the harbor of Colon. The wharves at Cristobal, which is the Canal Zone territory of Colon, were among the first works completed. Further extensions will be made to the breakwaters there.

Gatun Spillway, with Sluice Gates Open

The Cristobal Coaling Plant—Government to Sell Coal

The important work ahead at Colon relates to the erection of the coaling plant. The awards for this plant were made in August. It is significant that the contract calls for a larger plant than was originally projected. The Colon, or rather Cristobal, contract was awarded at figures a trifle in excess of $1,300,000 for the unloading towers and machinery. The complete control by the Government of the United States, both for military purposes and for the protection of commerce, is illustrated in the general scheme.

The technical explanation is simple. The plant will consist of two waterfronts and storage pile. The waterfronts will be designated as the unloading wharf and the reloading wharf, while the storage pile will consist of a basin for coal, a part of which will be stored under the water, and the remainder to be piled above it in the dry. The plant will receive, store and deliver separately, coal belonging to individuals and companies, as well as to the Government. It will receive it from any part of the unloading wharf, will transport it to any part of the storage pile, will reclaim coal from any part of the storage pile and deliver it to any part of the reloading wharf, and transfer coal from any part of the storage pile to any other part of the same. Coal will be received by traveling unloading towers supported by the unloading wharf, and reloaded to colliers and barges by traveling reloaders running on rails supported by the reloading wharf. The storage pile at the Cristobal plant is to be commanded by movable stocking and reclaiming bridges which traverse rails parallel to the longitudinal side walls of the coal basin.

Of significance is the official statement that the plant will receive from, and deliver coal belonging to, individuals and companies as well as to the Government. The Canal Commission took the position that its functions were to protect companies and individuals who might be placed at the mercy of a private monopoly. Therefore, it has arranged to provide them with facilities for handling their own coal as well as to sell it to them. The storage facilities provide for 300,000 tons, exclusive of the requirements of individuals and companies. This is to be divided into three equal parts—100,000 tons wet storage reserved for naval use, 100,000 tons dry storage for Canal use, and 100,000 tons in emergency storage. While ample provision is thus made for the navy, this is not to the detriment of commerce, for the 100,000 tons naval reserve will be turned over constantly.

It will be interesting to note the effect of the Government's coaling plant at Cristobal on coaling stations in the West Indies. Various ports there are looking forward to an increase in their commercial importance, some of them to the revival of past glories, by the coming coaling stations for vessels on the Canal route. But with the Government of the United States providing ample facilities at Colon and actually selling coal, it will be a question how effective any of the West Indian ports will become as coaling stations for the Canal traffic. That the sale of coal by the Government will serve as a price regulator is the general opinion.

Balboa the Important Terminal

The permanency of the Canal works, especially in their relation to commerce, is most apparent at Balboa on the Pacific side. Balboa today appears something as Gary once did when the Steel Corporation was pushing the building of that industrial center. While the construction work on the Canal is far advanced, the creation of the port of Balboa is in its incipient stages. Gorgona, where the railroad shops were located, ceased to exist a month ago because the waters of the Canal when let in would swallow it up. Part of the shops were removed to Empire, but the foundry and planing mill are already in operaton at Balboa.

Acres of skeleton steel structure are now going up at Balboa. The main repair shops will be there and will maintain the equipment for the locks, spillway and power plant machinery, the water and land equipment retained for the maintenance of the Canal, the rolling stock and equipment of the Panama Railway, the mechanical apparatus connected with the coaling plants, fortifications, coal storage plant, wireless stations, the making of repairs required by commercial vessels and by private individuals and corporations, and the making of such repairs as may be required by the vessels of the United States Navy. This will give some idea of the permanent work that has to be done.

The main dry docks of the Canal are also to be located at Balboa, while the piers for commercial use will be extensive. The Balboa coaling plant will not be so large as the one at Cristobal, but it will be sufficient for its pur-

pose. Since the permanent administration and Canal headquarters will be at Balboa, a suitable building is going up. The steel work is already erected.

The Pacific entrance of the Canal at Balboa is by most authorities looked upon as the main terminal of the Canal. This is simply a recognition of the importance of the commerce of the Pacific. The master minds in the great ocean transportation lines take the same view as the Canal Commission on this point. The commerce of the Pacific becomes the prize for which all nations contend, just as does the naval supremacy of that ocean.

Diversion of Traffic from Existing Routes

Quiet inquiry in shipping circles shows how thoroughly the influence of the Canal on world traffic has been studied, and how well prepared existing lines are to utilize the Canal. It is very apparent that all of the great transportation lines which see the possibilities of the Canal have made their plans for its immediate utilization. The vast fleet of tramp freight steamers, many of them under charter, could not be expected to be so well prepared. But there are evidences that they will follow quickly in the wake of the big transportation lines, and it is perfectly well understood that ultimately much of this Panama Canal traffic will be controlled by these steamers.

Colonel Goethals and his associates in the Canal Commission quietly discourage any spectacular features about the passage of vessels through the Canal. The dredges and tugs will go through first because they are needed in the works. After that it may be that the Fram, Captain Amundsen's little ship, will go through, but hardly until one of the regular vessels of the United States has made the passage. It may be the beginning of the new year when the commercial fleet will pass through. It may be a little later. The Commission, with its usual conservatism, makes no promise whatever, but all the evidences are for a speedy dedication to the uses of world commerce.

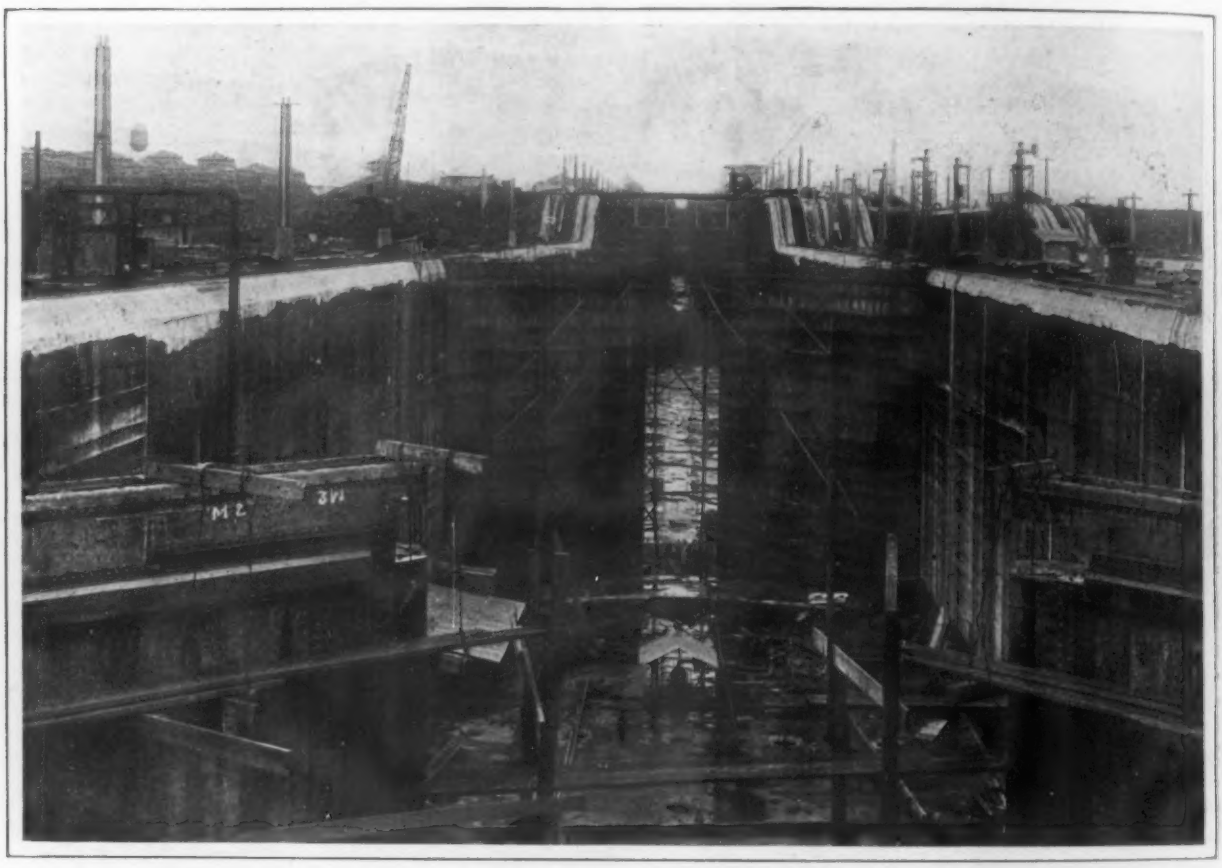
It is apparent that there is going to be an early tryout as to the extent to which traffic may be diverted from Suez and other existing routes. The Canal will not immediately call into existence a new commerce, although indications are already seen of its effect in creating commerce especially in South America. But for the present it is only the existing commerce that will shift its route. The prediction is made here that one of the earliest effects will be the transfer of the Hawaiian sugar crop. This ultimate result was anticipated when the Diaz Government in Mexico rebuilt the Tehuantepec Railway and spent such large sums on port improvements on the Pacific and the Gulf of Mexico terminals. But it was then thought that the Panama Canal would not be completed and be in competition with the Tehuantepec route short of 10 or 15 years. Now it looks as though Mexico will be the first section of the world to feel the diversion of traffic to the Panama route.

Wheat and Lumber from the Pacific

Up along the Pacific coast there are said to be numerous cargoes of lumber which will be ready for shipment by the beginning of the new year. There seems to be no fear that Congress will modify the provision of the law which favors coastwise shipping.

A later development, but one which cannot be tried out for a year, is the passage through the Canal of Canadian wheat. When the President fixed the tolls, it was assumed that these were low enough to encourage the wheat haul from Vancouver to Liverpool. Representatives of the Canadian railroad and steamship lines who came to Panama varied in their opinions as to the area in the Canadian Northwest which would contribute to the Panama traffic, but most of them fixed it considerably east of Calgary, approximating longitude 105 deg. West.

The undetermined question, however, is how the wheat will stand the humid climate of the Canal area. The fear exists that the wheat harvested in western Canada, which is sometimes wet and tough on account of exposure to early frosts and fogs, may sprout or rot if shipped through the Canal. A remedy for this has been suggested in providing for drying grain intended for shipment through the Canal, in the elevators at the western terminals of the Canadian railroads. It is one of the open questions which only can be settled by experience.



Looking South through Middle and Lower Lock Gates at Gatun

South American Preparations to Use the Canal

Among the first cargoes coming up the west coast of South America will be nitrates and ores. The tolls are light enough to divert considerable shipments of nitrates from the Straits of Magellan through the Canal. The Chilean Government has had a commission studying this whole subject, both at Panama and in the United States. Chile at one time proposed a joint Chilean-American line with a subsidy from both countries. The United States could give no such guarantees, and Chile has since gone ahead on its own account. The Peruvian Government, which two years ago established a steamship line of its own in competition with the English and Chilean companies also plans to extend its service to the United States, but there are no nitrate cargoes for it.

It is ascertained that the transatlantic lines which now have a service to Colon are preparing for sharp competition among themselves. In a quiet way there is considerable rivalry with a view to getting the first steamers through the Canal and down the west coast with cargoes of general merchandise. The German lines seem to be best prepared for this venture. The Italian lines recently announced their purpose of entering the same field.

From Panama as a survey point, it is already possible to note the effect of the Canal on the projects for harbor improvements which for so many years have been held in abeyance. Chile, as usual, is most active, and not only Valparaiso but other ports are really getting ready for the Canal. Peru has various projects, but has done little actual work. In Ecuador, the sanitation of Guayaquil, which is the real problem, since the harbor there is ample, is subject to complications of internal politics. On the Pacific coast of Colombia there is at last a real effort to provide facilities for the vast region which is tributary to the Pacific, and whose only outlet is through Tumaco to Buenaventura. The latter is the main outlet. Recently the engineers of a great English contracting firm passed through Panama en route to Buenaventura to make studies for the Colombian Government of the improvements necessary there. This is the first sign that Colombia recognizes the existence of the Canal.

While the European shipping lines have made their preparations for the immediate utilization of the Canal, there seems to be no cause for worry over the supposed negligence of American interests which are most concerned with proper shipping facilities. In a quiet way, and without unnecessary publicity, the whole situation has been studied. The American enterprises most vitally concerned will have their own ships. Something may be written of these plans later.

In the preparations of existing transportation lines to take early advantage of the Canal, the importance of the coal supply stations is not underestimated. It is recognized that the fuel expense incurred will have a great deal to do with the prospective diversion of traffic from other routes. This was one of the reasons, aside from military ones, which caused the coal plants to be established on so extensive a scale. Prof. Emory R. Johnson, in his report on which the President based the Canal tolls, said that the surest method of keeping coal prices low at the Isthmus was for the Government to maintain commercial coaling stations at Cristobal and Balboa. Cheap coal on the Isthmus now becomes a very essential element in the Government control of the Canal.

The extent to which oil is going to supplant coal as fuel is yet uncertain. But a marked increase in its use is noted. The Government, through the Canal Commission, follows the same policy in regard to fuel oil as it does in regard to coal. It will pipe the oil across the Isthmus and will control the price.

These are a few of the many interesting features connected with the Canal at a time when the constructive engineering work is closing and the era of operation is at hand. A little later it will be possible to study more intelligently the effect on world commerce, and especially on the commerce of the United States.

South Guard Gates of Pedro Miguel Locks, Looking through Arches

The Ferrum System of Wrought Piping

Some of the Forms of Pipe Joints for High Pressure Work

In the last few years a number of installations have been made in the western part of this country of the so-called Ferrum system of high-pressure piping, and for the general interest alone in the numerous forms of pipe joint patented the following information has been obtained. The piping is manufactured by the Actien-Geseilschaft Ferrum, Zawodzie bei Kattowitz, Germany, and its use is largely in connection with high-head water-power developments. Some of the information is based on an exhibit of the company at the Leipzig Exposition, which was visited this summer while the American Society of Mechanical Engineers was touring Germany, and some of it was obtained from the Pelton Water Wheel Company, agent for the system in the United States and Canada.

About 40,000 ft. of varying diameters has been installed for 20 different projects in the United States and Canada, not including some 2700 ft. used in Alaska. The thickest pipe is that provided for Los Angeles, about 1¼ in., and 55 in. in diameter, while the largest also went to Los Angeles, 7 ft. in diameter, with walls 11/16 in. thick. Referring to the group of pipe joint illustrations, which represent a part of the total collection supplied to *The Iron Age*, it may be mentioned that Fig. 4 shows the type of joint mostly used in this country's installation. Fig. 13 is the type used in the Canadian plant for piping ¼ to ⅜ in. in thickness and 16 to 12 in. in diameter for a head of 1280 ft. of water. The type of joint shown in Fig. 12 is used

Fig. 1—Banded Pipe Showing Bulging After Pressure Test

in two plants, one in Utah, for a head of nearly 2000 ft. of water, taking piping slightly over ¾ in. thick and 18 in. in diameter, and the type shown in Fig. 15 is used for the higher pressure portions of the Los Angeles installation.

The pipe itself is of wrought steel, lap-welded by water-gas heat and then annealed to remove welding stresses in the metal, and coated with a rust-protecting compound. The thicknesses recommended by the Ferrum Company for pipes of 38, 40 and 48 in. diameter are ⅜, 7/16 and ½ in. respectively, and the employment of lighter pipe is deprecated. A basic steel is used having a tensile strength of 51,600 to 60,000 lb. per sq. in. and at least 25 per cent. elongation in a length of 8 in.

The plate is rolled into cylindrical form, with the edges overlapping, on a set of horizontal bending rolls, and the broadly overlapping edges are heated inside and out to welding heat by water-gas jets and then welded together by hand or power hammers. The stresses left in the steel after welding are then removed by heating the pipe in an annealing oven to a red heat and rolling true in the bending rolls. The heating is also to remove rust, leaving the pipe ready for the application of the protective coating—a somewhat elastic tar-asphalt product, applied warm, and stated to be effective in withstanding blows and abrasion as well as in preventing otherwise rapid rusting. Two separate constructions for the pipe are employed, according to the thickness, or equivalent thickness, of the plate necessitated by the service pressure, viz., lap-welding or wedge-welding of plain pipe, and banding of lap-welded plain pipe.

Plain and Banded Pipe

The maximum thickness of plate for welding by the water-gas process is 1 in., this limit being imposed by the inability of the heat to penetrate to the inner surfaces of the steel—although by extended scarfing of the corners of the lap, welds have been made in steel up to 1¼ in. in thickness. With greater thicknesses, up to about 17/16 in., so-called "wedge-welding," in which a separate square bar is welded in between the heated edges of the plate, can be used instead of the lap weld, but it requires particularly careful and competent labor; and as it leaves two seams side by side it is considered inferior to the single long joint, inclined to the surface of the pipe, of the lap weld already described.

Modern operating conditions demand a pipe structure having a strength up to 3⅛ in. equivalent thickness. In order to provide stronger pipe than that given by lap-welding or wedge-welding of plate of the thicknesses mentioned, the other construction, by banding the pipe with steel rings or bands rolled out of the solid billet and shrunk on to plain pipe, is employed. Fig. 1 is a photograph of the section of this form of pipe after a test, showing the bulge of the material between the bands by the testing pressure. In making a pipe of strength equivalent to a thickness of 2 3/16 in. a seamless rolled pipe core of say 1 in. thickness is used, the rest of the effective material, corresponding to the remaining thickness of 1 3/16 in., being put on in bands. In order to do this economically the size and spacing of the bands are calculated so that the internal pressure will strain the material between the bands, and the bands themselves, to the elastic limit at the same time. It has seemed desirable to use a few bands of large cross-section, rather than many small bands.

The test section of banded pipe was made up of bands of different size, heavy at the left and lighter at the right, the object being to observe the amount of bulging that was produced by the internal pressure when opposed by the differing resistance of the bands. It is seen in Fig. 1 that the spaces between the lighter rings bulged considerably.

Five general types of joints are employed for making up the Ferrum system into pipe-lines, according to the conditions of installation and service, as follows:

1. The standard lead muff joint, designed for pressures of 90 to 150 lb. per sq. in., according to the pipe diameter, is shown in Fig. 2. It allows only small angular deflections in the pipe-line, and is not regarded suitable for a line that is to be laid above ground, or that will otherwise be exposed to temperature changes or other causes of alternate expansion and contraction. The joint is packed with hemp and lead, as the ordinary flanged cast-iron pipe.

2. The riveted muff joint, Fig. 3, for high and low pressures, is expensive and laborious to install and will not take up expansion and contraction, so that a pipe-line made with this type requires separate expansion joints. The straight end of one section of pipe is inserted in the belled-out end of the adjacent section and the two are riveted together. The ends of pipes of large diameter, it is stated, can not be made of great accuracy to size, and as sagging of the pipe by its own weight and the shocks of transportation tend to deform the ends of the pipe from the circle, some clearance must be allowed in making the bell ends, and this extra clearance between the inner and outer laps militates against a good job in the riveting and calking and makes the installation a long and tedious operation, often requiring special appliances. In small-diameter pipe the rivet heads inside increase the fluid friction.

These objectionable features are claimed to be overcome in the Ferrum joint shown in Fig. 4, wherein both ends are shaped to a conical flare. Any deformation of the ends is held to have no detrimental effect by the self-centering action of the engaging cone surfaces. The rivet heads, it is added, cause little if any contraction of the area of the pipe. For a straight pipe-line the particular lengths which are to go together in the field are brought together and made tight in the shop and then drilled for the rivets, the ends also being matchmarked. This joint has been used principally in North America, as stated, under the name of bump joint. Where it is necessary to deflect the line slightly—as, for example, in order to make up for small inaccuracies in surveying—the spherical riveted form may be used, as in Fig. 5, allowing the pipe to be turned in any direction. In such cases the rivet holes are drilled in the field.

3. The high pressure flange joint, Fig. 6, is adapted to high working pressures and the greatest thicknesses of pipe-steel up to 1 in. In order to renew gaskets the pipe-line must be taken apart. Separate expansion joints are required, and angular deflections are possible only when taper filler rings, or "dutchmen," are used between

flanges. The flanges may be either fixed, that is, welded on to the pipe-ends, as in the angle flange pipe-end and the ordinary flange joint illustrated, which leaves an unannealed circular seam in the pipe; or movable, in the form of lap-welded flange rings engaging flanged projections welded on to the pipe-ends, Fig. 8. Unless the flange rings are made very strong, however, deformation takes place when the bolts are screwed up, and when this buckling of the ring has once begun the more the bolts are set up the less effective they become in holding the pipe joint tight.

These objections are claimed to be overcome in the Ferrum joint, by forming the movable flange rings with outer projecting rims which bear together and allow the bolts to be set up as tight as desired without risk of deforming the rings. By recessing the movable rings where they engage the pipe flanges, as shown in Fig. 9, the joint becomes, it is claimed, self-centering. The pipe-flanges may be formed by upturning the ends of the pipe itself, instead of welding on a ring, and three standard designs, shown in Figs. 10, 11 and 12, have been worked out with this construction for light, medium and heavy pipe, respectively.

4. The Ferrum patent high-pressure muff joint, Fig. 13, is stated to be adapted to the highest service pressures and to pipe thicknesses up to 1¼ in. plate. The gaskets can be renewed without taking the line apart. In the form with plain cylindrical end, since the joint is free to move a little axially, expansion and contraction are taken up and separate expansion joints, it is claimed, are unnecessary. Also, small angular deflections that occur owing to inaccuracy in the masonry work at the pipe-line supports and anchorages are taken care of without the use of wedges or dutchmen.

Fig. 14 shows an interesting modification of this joint, having spherical ends to allow of large angular deflections, but no expansion. In case expansion has also to be taken care of the standard form of muff joint should be used in conjunction with the ball form.

5. The Ferrum patent ring flange joint, Fig. 15, is adapted to high working pressures and to thicknesses of plate over 1 in. The flanges themselves are rolled out of the solid billet, and are fastened on to the pipe by the projections and recesses shown, which are turned to template. The flange itself is heated to a dull red and then slipped on. When it cools it is fast in the recesses, and longitudinal movement is no longer possible. If desired, these flanges can either be fitted on so that they can be turned, or actually tight on the pipe. This joint is principally useful for banded pipe. The gaskets can be inserted from the inside, without taking the pipe-line apart.

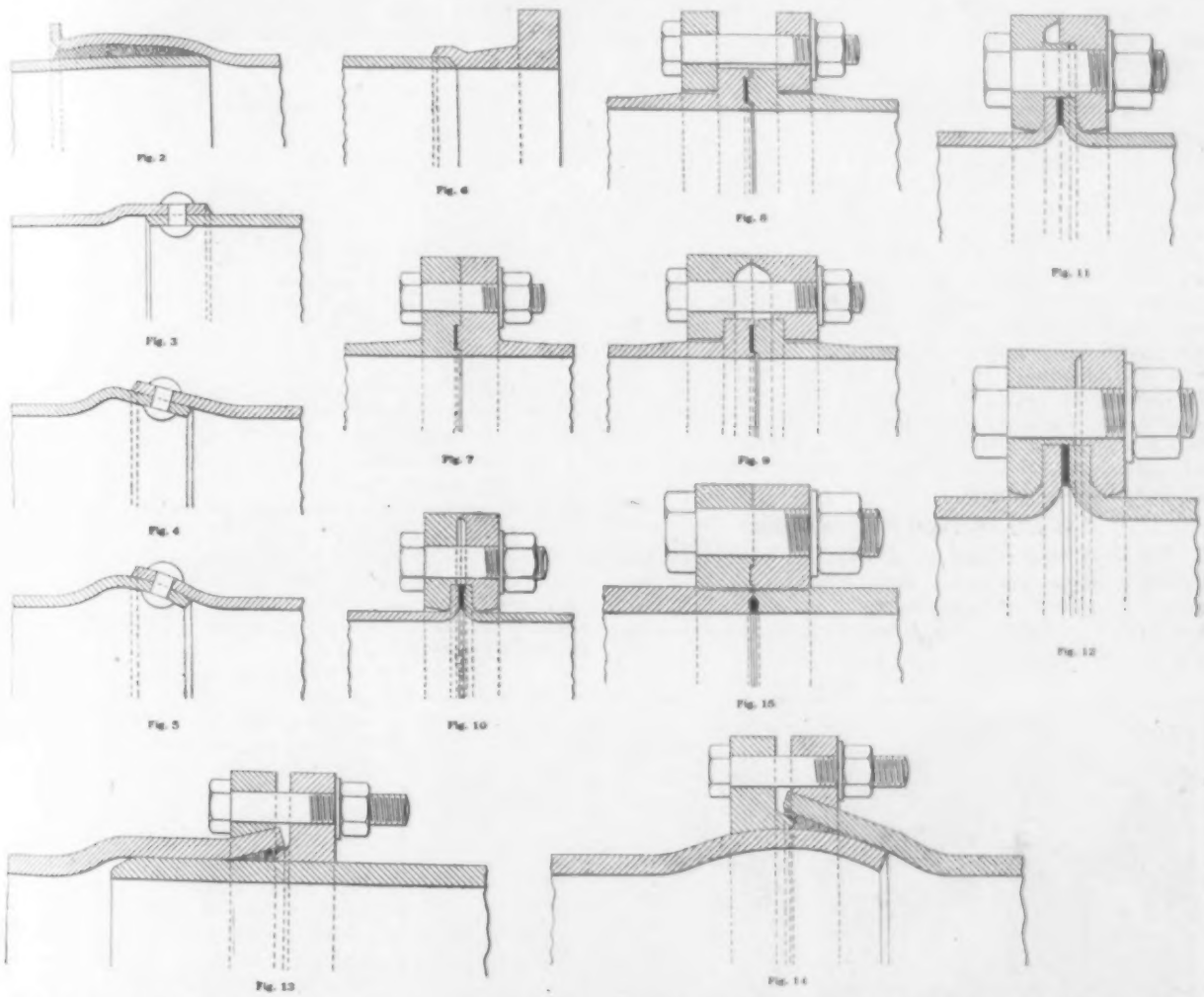


Fig. 2, the standard lead-calked muff joint; Fig. 3, riveted muff joint with cylindrical muff; Fig. 4, riveted muff joint with conical lap; Fig. 5, riveted muff joint with spherical lap; Fig. 6, angle flange ring lapwelded to pipe; Fig. 7, flange joint with angle flanges welded on; Fig. 8, flange joint with welded-on flange projections behind which rest loose flanges; Fig. 9, high-pressure flange joint with lapwelded flange projections; Fig. 10, high-pressure flange joint for light plate; Fig. 11, high-pressure flange joint for medium thickness plate; Fig. 12, high-pressure flange joint for heavy plate; Fig. 13, high-pressure muff joint; Fig. 14, spherical high-pressure muff joint; Fig. 15, ring flange joint

SKETCHES ILLUSTRATING THE FIVE DIFFERENT TYPES OF FERRUM SYSTEM PIPE JOINTS

The use of asbestos protected metal for the roofing and siding of buildings forming a part of steel mills has been given impetus by an unfortunate accident in the gas producer building of a large steel plant. Several men were killed and others injured by tiles loosened from the purlins by an explosion. Officers of the steel company in question state that they have definitely determined to remove as promptly as possible all tiled roofs installed on gas engine and gas producer houses of their company. Asbestos protected metal has already been standardized as a roofing and siding for various classes of buildings in steel mills, 16 steel companies being continuous purchasers. The American Steel & Wire Company was the first of these to purchase this product, having begun its use some five years ago.

Use of the Microscope in the Study of Metals

Cases in Which It Disclosed the Causes of Important Steel Foundry Failures, Causes Not Otherwise Discoverable

BY EDWIN F. CONE

The extent to which the microscope has become necessary in solving certain metallurgical problems is made apparent by the fact that this country leads in the extent of its application to the study of metal structures. Its use has constantly broadened until there are over 350 metal-working establishments in the United States alone equipped with it. Every steel mill of importance and many automobile plants have a metallographic laboratory and the subject is taught in nearly every scientific or technical school here and abroad. Metallurgists and chemists graduated 20 years ago will remember that metallography was not taught then. Formerly it was thought possible for the chemist to ascertain the causes of the failures of certain steels by means of acids and a balance. Problems which he could not solve or solved unsatisfactorily were regarded as mysteries, or the cause of failure was wrongly assigned. Today the microscope is a necessary adjunct to successful metallurgical work and there is scarcely a problem in steel failures in which it may not play a vital part in clearing up the case. From the writer's own experience a few cases are presented in which the microscope was the only means of determining conclusively the causes of certain unusual physical results which were baffling to routine chemical analysis.

Highly Oxidized Steel in Billets

The first case relates to open-hearth billet steel and presents some interesting developments. A test bar, turned from a forging made from one of the billets of the heat, heat-treated and annealed, gave the following physical results:

Tensile strength, lb. per sq. in.	Elastic limit, lb. per sq. in.	Elongation in 2 in., per cent.	Reduction of area, per cent.	Fracture
70,000	36,000	31.5	47.8	cup

These appear normal, but were not up to expectations and specifications. Accordingly a test bar was taken from one of the billets which gave the following results:

Tensile strength, lb. per sq. in.	Elastic limit, lb. per sq. in.	Elongation in 2 in., per cent.	Reduction of area, per cent.	Fracture
58,500	30,000	39.0	61.1	cup

These are in themselves excellent, but again created suspicion. The steel was bought for 0.40 carbon with a consequent tensile strength of 80,000 lb. per sq. in. after treatment. A careful chemical analysis of some of the steel was then made which showed the following:

	Per cent.
Carbon	0.44
Manganese	0.44
Silicon	0.061
Sulphur	0.035
Phosphorus	0.015

Forgings made from steel of this composition should normally give a tensile strength of at least 80,000 lb. per sq. in. with proper heat treatment. The tensile strength of the raw steel should certainly be higher than 58,500 lb. per sq. in., nearer 75,000 lb. In order to ascertain the effect of various heat treatments and possibly the cause of the previous abnormal results, the steel was subjected to various treatments. In no case was it possible to obtain a tensile strength higher than 75,500 lb. per sq. in., even by quenching in oil without drawing back. The various physical results obtained by different heat treatments of this steel are shown in Table 1.

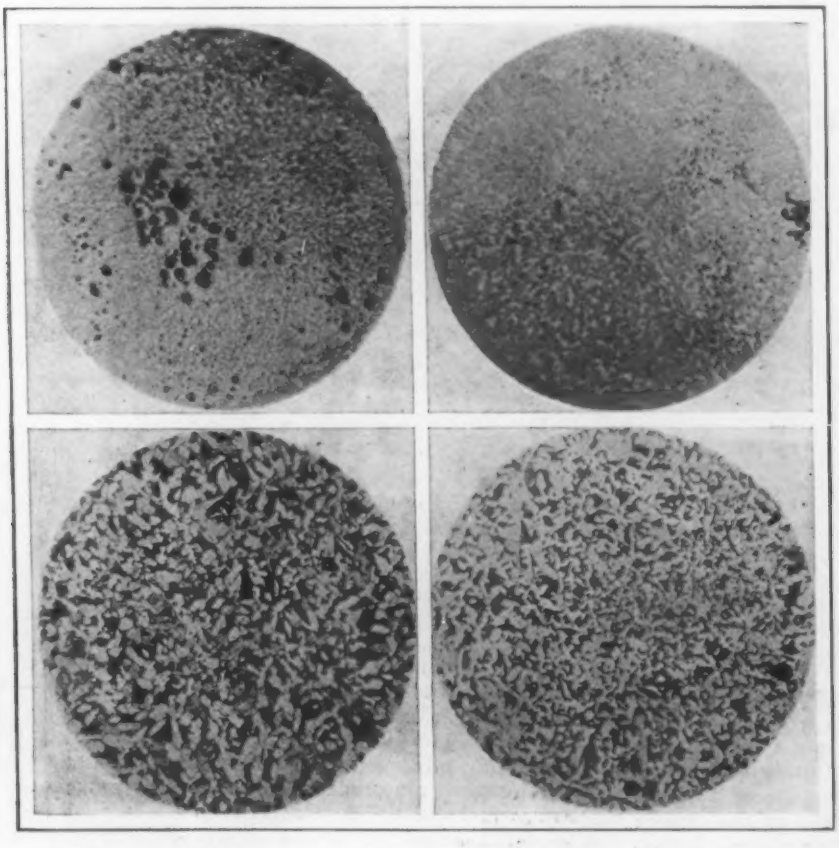


Fig. 1 Fig. 2
Fig. 3 Fig. 4

Photomicrographs of Sections of Steel Billets Reduced About One-third from the Original Diameter of 87. Figs. 1 and 2 Represent the Unetched and Figs. 3 and 4 the Etched Condition of the Specimens

Investigations as to the condition of the heat treating apparatus, pyrometers, and the testing machine showed everything to be normal. Here was a case in which the routine chemical analysis failed to explain the abnormal physical results, abnormal in the sense that they were contrary to those heretofore obtainable from steel of such composition, but excellent tests and normal when regarded apart from any other considerations. Analyses showed arsenic, aluminum and any other possibly damaging elements to be absent.

But this steel when examined under the microscope revealed a surprising condition. The presence of large quantities of black substances located all through it was immediately discovered, indicating an abnormal condition and one tending to weaken it decidedly. Figs. 1 and 2 show this condition strikingly. They are photomicrographs of unetched portions of tests 1 and 3 respectively in Table 1. To demonstrate that the heat treatment in these cases was normal these specimens were etched and photographed as shown by Figs. 3 and 4, which are from physical tests 1 and 3 respectively. They show the even and normal structure to be expected under the conditions. It is therefore readily seen that the microscope solved the problem, in that it demonstrated that the steel was a highly oxidized one, contaminated with oxide, slag, etc. This is further partly corroborated by the fact that a large quantity of the drillings dis-

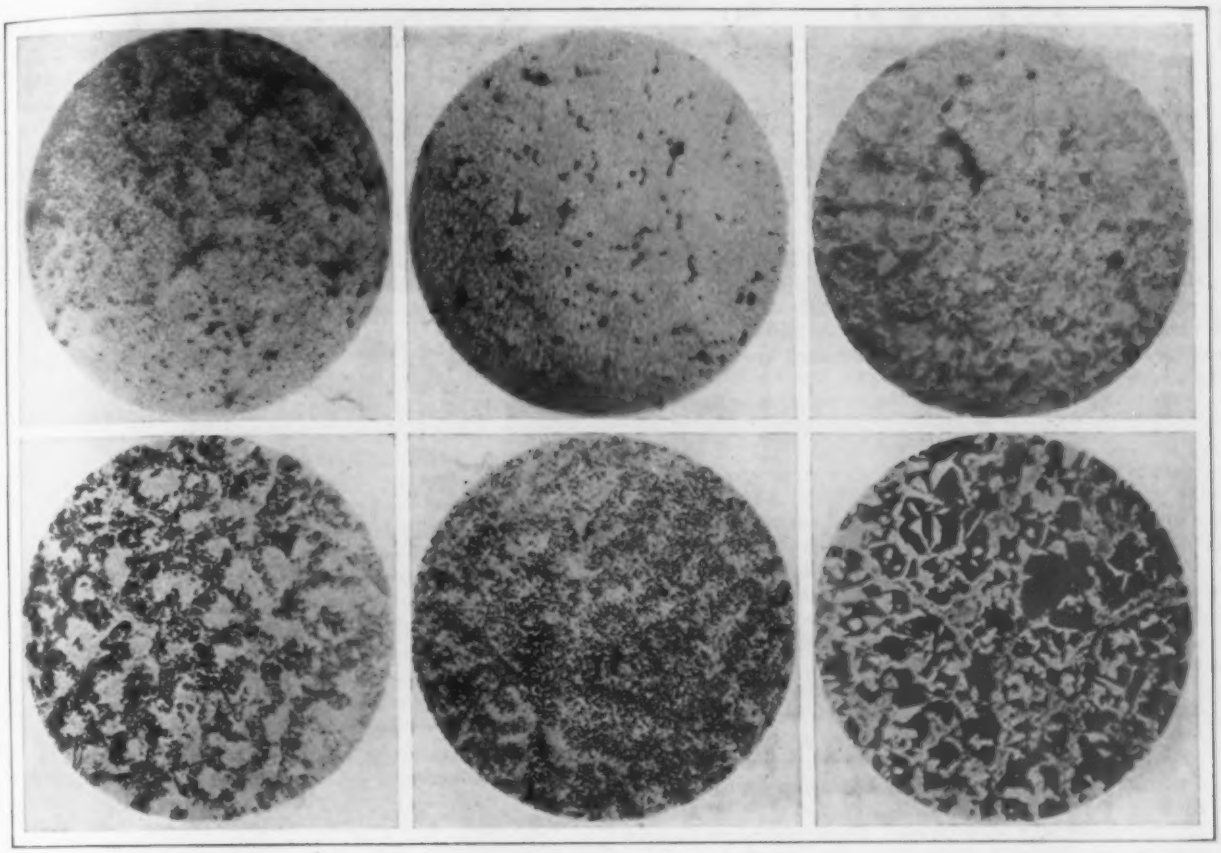


Fig. 5 Fig. 6 Fig. 7
Fig. 8 Fig. 9 Fig. 10

Photomicrographs of Sections of Steel Castings Reduced About One-third from an Original Diameter of 87. Figs. 5, 6, and 7 Represent the Unetched and Figs. 8, 9, and 10, the Etched Condition of the Specimens

solved in dilute acid gave a quantity of insoluble matter amounting to 2.32 per cent., which was found to be largely an iron oxide.

Table 1.

Test	Tensile strength, lb. per sq. in	Elastic limit, lb. per sq. in.	Elongation in 2 in., per cent.	Reduction of area, per cent.	Fracture
1	70,000	36,000	31.5	47.8	cup
2	58,500	30,000	39.0	61.1	"
3	67,000	35,500	28.5	38.8	"
4	75,500	43,000	24.5	46.3	"
5	66,500	33,500	33.5	44.9	"
6	69,000	34,000	28.5	32.5	bad cup
7	66,000	38,000	31.5	46.3	"
8	67,000	34,500	33.5	52.0	"
9	72,000	42,000	30.0	38.8	irregular
10	72,500	45,000	32.0	49.2	"

Obscure Defects in Steel Castings

A large steel foundry was having considerable trouble with its steel. Physical tests were failing to meet specification requirements. The steel was losing its ductility and breaking with a fracture that had an abnormal appearance. This condition had been coming slowly until the rejections of castings on physical failures grew to be alarming. So far as could be learned by ordinary investigation, the steel was being made in the usual way and had no abnormal appearance to the eye. The annealing conditions were found to be ideal and reannealing of the castings yielded no benefit in the physical properties. The routine chemical analysis disclosed no unusual conditions. The trouble did not display itself in every heat of castings but only in intermittent ones. Had the laboratory been equipped at the time with metallographic apparatus things would have been righted promptly, whereas betterment came only after much inconvenience and loss.

Subsequently microscopic examination of various specimens of the steel that failed showed a condition of metal poisoned by oxidation and slag inclosures. Some of the metal was vanadium steel and some was high carbon plain steel. Figs. 5, 6 and 7 show specimens of this steel in its unetched condition, indicating plainly its abnormal state. Figs. 8, 9 and 10 are respectively photomicrographs of the same specimens etched, showing how excellent was the heat treatment. The dark impurities are plainly discernible, even in these. It is easy to tell that the first two steels are vanadium, while the third is plain carbon. The abnormal conditions were undoubtedly due to poor furnace practice, resulting in a contaminated steel that ordinary heat treatment could not correct.

Another steel foundry was experimenting with a method of purifying its steel. The metal was made and annealed in the usual way. There was no abnormal appearance, favorable or otherwise, in the pouring, in the condition of the metal, or in the appearance of the castings, so far as the eye could detect. But the physical tests from the regularly and normally annealed metal were poor and abnormal. Some of the tests of the unannealed and annealed castings are given in Table 2.

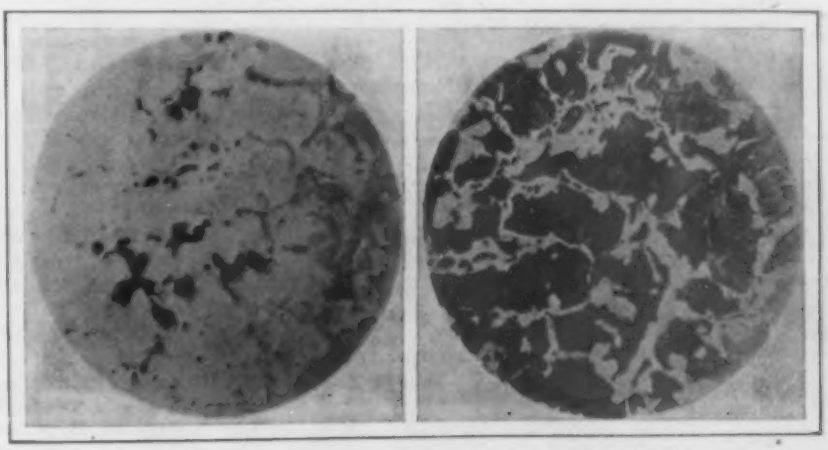


Fig. 11 Fig. 12

Photomicrographs of Section of Steel Casting Reduced About One-third from an Original Diameter of 87. Fig. 11 is the Unetched and Fig. 12 the Etched Condition of the Specimen

Table 2.

Test	Tensile strength, lb. per sq. in.	Elastic limit, lb. per sq. in.	Elongation in 2 in., per cent.	Reduction of area, per cent.
Before annealing:				
1	92,000	55,000	7.0	7.8
2	92,300	60,100	6.0	5.6
3	91,000	55,000	7.0	...
4	90,000	56,000	7.5	8.5
After annealing:				
5	90,000	46,500	13.0	17.0
6	89,000	47,000	13.5	17.8
7	86,000	47,000	9.0	11.5
8	89,000	42,000	16.5	18.8
9	85,000	43,500	12.5	13.4

These tests are abnormally low in ductility and their striking characteristic is that the tensile strength after annealing is considerably less than before—a condition that obtains in no normal carbon steel casting. The annealing was known to be normal. The chemical analysis revealed the composition to be:

	Per cent.
Carbon	0.40
Manganese	0.76
Silicon	0.357
Sulphur	0.036
Phosphorus	0.036

This is normal, and further chemical investigation showed nothing unusual. The usual resources for explaining extraordinary conditions being exhausted, some of the metal was prepared for examination under the microscope, the foundry testing department being equipped with a good metallographic outfit. Specimens of the metal as it appeared under magnification are shown in Figs. 11 and 12, the former being the unetched and the latter the etched condition of test No. 4 in Table 2. Here again is found a poisoned steel, the condition of which ordinary methods would not reveal. The agglomerated enclosures of a foreign chemical compound and a slag which appear as black spots in the photomicrographs are the cause of the poor physical properties of the steel. These foreign masses are imbedded among the ferrite crystals, greatly weakening the steel. It is evident that the microscope was the only solution of the abnormal conditions. The purifying substance had probably been improperly used, resulting in a non-elimination of the results of its actions and a consequent contamination of the steel.

The three examples demonstrate how important a place the microscope has taken merely in the field of general metallurgical analysis. Its place and value in general research work are almost unlimited. The importance of having such an outfit ready to use is demonstrated by the two foundry problems cited. In the second a trouble that might have extended to many heats and contaminated many castings was immediately averted, while in the first case a prompt recourse to the microscope would have decisively located the trouble and also saved much financial loss.

The microscope is now nearly as necessary to the progressive steel maker and foundryman as a chemical or physical laboratory. Chemists in the steel industry who were graduated before metallography was a part of a technical curriculum must awake to the fact that they must perfect themselves in its application to much of their work or soon be considered behind the times.

The Development of Foreign Trade

Present Observations of President Farrell of the Steel Corporation

Some valuable and timely suggestions on developing further exportation of American manufactures were made on September 25 at the Hotel Astor, New York, by President James A. Farrell of the United States Steel Corporation before the American Manufacturers' Export Association. From the address the following has been taken:

Those engaged in conducting an export business appreciate the difficulties and almost insurmountable obstacles to be overcome. However, they are not insuperable, and it is largely a question of adapting ourselves to prevailing trade customs, complying with requirements, adopting current system of weights and measures, furnishing goods such as the buyer is accustomed to receive and selling at competitive prices in the currency of the country to which the goods are shipped. These are some of the fundamentals to be considered in establishing a foreign trade.

The export commission merchants are valuable mediums to manufacturers. They are arteries, so to speak, with facilities in various markets, and their contact with buyers in distant countries insures constant knowledge of trade conditions. Selling and distributing is of paramount importance. The manufacture of goods is usually simpler than the determination of the proper channels through which to sell them, and the human factor, and not alone the goods offered, is frequently responsible for results. The goods must be right, of course, but, as a large percentage of exports is consumed by people whose ideas and requirements differ from ours, the proper effort must be made to reach and interest them.

The Expansion in American Exports

My observation, extending over many years in the export business and based on direct personal acquaintance with the world's markets, warrants the statement that the products of our country and our methods of doing business are equal to, and in many cases superior to, the products and methods of our European competitors. American manufacturers are increasing the efficiency of their plants and are entering an era of expansion in the foreign commerce of the country. This is reflected in the large increase in the past few years in the exports of manufacture, and equally large decreases in the exports of unmanufactured products.

For the fiscal year ended June 30, 1913, our total exports of domestic merchandise were $2,428,506,358. This amount included food-stuffs, crude, about 7½ per cent.; food-stuffs, partly or wholly manufactured, about 13 per cent.; manufactured goods, about 49 per cent.; cotton and other crude materials for use in manufacturing made up the balance. The balance of trade in our favor for the year amounted, in round figures, to $653,000,000. The total value of our exports of domestic merchandise for the twelve months exceeded by $258,000,000 our exports for the preceding fiscal year.

Wisdom of American Investments Abroad Suggested

The growth of our export trade has resulted during the past few years in the establishment of several additional lines of steamers to Latin-American and other foreign ports, where insufficient facilities previously existed, and the continued increase in trade should be accompanied by a corresponding enlargement of ocean transportation facilities.

As a rule, we are intent upon being merchants, rather than investors, and, up to the present, investments of American capital in foreign countries has been of a limited character. Our capital has been employed at home, rather than abroad and, when it is considered that England's investments in railways and industrial enterprises in Argentine alone yield $250,000,000 annually in interest return, it explains to some extent the hold that Europe has and will have for many years on business in various consuming markets.

Our consular service is a valuable help to the exporter. Its efficiency is increasing, and the sincerity of consular officers and the interest taken by them in extending trade has enabled American manufacturers to secure information of a reliable character. The retention of competent and experienced consular officials in the service is encouraging. The Pan-American Union has rendered invaluable assistance to merchants, manufacturers, and producers and, through its efficient staff, has done much to foster friendly relations between the republics of North and South America.

The importance of this association can hardly be overestimated as a factor in the economic development of the country. It deals with the multidinous detail incident to exports and discusses matters of vital interest to American export trade. Dissemination of information, interchange of ideas, and co-operation tend to stimulate an intercourse which is of material, as well as of educational, value to its members and place our manufacturing industries upon a more intelligent basis to meet the commerce of the world.

The American Steel & Tin Plate Company announces a change of location of its branch office at Detroit, Mich., from 1716 Ford Building to 2126 Dime Bank Building.

Enameling Iron and Steel*

Chemical Constituents for the Steel—Necessity for Acid-Proof Enamels

—— BY RAYMOND F. NAILLER† ——

Cast-iron enamels are applied to castings of the desired shape. In the case of cooking ware enamels the shapes are constructed by pressing and spinning. For heavier equipment such as jacketed kettles the apparatus is constructed by riveting or preferably welding the sheet steel in the desired form. The selection of the steel with a view to its chemical analysis is of prime importance. A reliable specification reads as follows: Sulphur, below 0.040; phosphorus, below 0.030; manganese, about 0.40; silicon, about 0.010; carbon, about 0.10. The steel must necessarily be free from laminations or other mechanical imperfections. For heavy apparatus the sheet ranges from 3/16 to ⅜ in. in thickness. The preferable practice is to construct the apparatus in one piece by means of autogenous welding, thus avoiding the use of gaskets or other packing materials in erection. That the enamel may properly adhere to the surface of the metal, the latter must be free from dirt or scale and in the case of welded joints the welds must have a preliminary grinding to reduce the roughness. The entire surface of the apparatus is then cleaned by pickling or sand blasting, the latter process being altogether used in cleaning large apparatus. As the crude ware leaves the sand blast it has a roughened, clean, metallic surface and is in the proper condition to receive the enamel.

In general there are two kinds of enamel, known as ground coats and cover coats. The former serves as a bond between the enamel and the steel, and the latter serves to build up the body of the enamel and presents the finished surface. In the ground coat color is no object. Its composition is such as to render it adherent and strong. In addition to the ordinary components cobalt oxide seems to be essential to the production of adherence. In the manufacture of acid-proof enamel, the cover coat is essentially a high silicate and must be free from any metallic oxides, such as oxide of tin, lead, iron, etc. The piece to be enameled receives one ground coat which is burnt well into the steel at a high temperature. The cover coats may be one or two in number for ordinary enameling, but should be at least triple for acid-proof work. In the production of acid-proof apparatus, the use of a ground coat or cover coat is now eliminated and the same material which in place of being an enamel, as commonly termed, is in reality a boro-silicon glass and without the use of any metallic oxides in its compounding.

Dark Blue Cooking Ware Enamel

It is interesting to note the chemical changes which take place in the various stages of the production of the finished enamel. As a starting point, let us select a cover coat formula used in the production of a dark blue cooking ware enamel.

Feldspar, lb.	120	Saltpeter, lb.	7
Quartz, lb.	72	Oxide of Cobalt, lb.	7½
Borax, lb.	80	Oxide of Manganese, lb.	1
Cryolite, lb.	30	Clay in the mill, per cent.	4

After noting in detail the chemical constituents of the material, and their behavior when heated and considering that the water, nitrogen pentoxide and flourine are vaporized, the author finds for the constituents of the frit:

	Lb.	Per Cent.
Silica (SiO_2)	156.0	53.5
Alumina (Al_2O_3)	27.6	9.5
Soda (Na_2O)	59.2	20.3
Potash (K_2O)	10.5	3.6
Boric Oxide (B_2O_3)	29.6	10.2
Cobalt Oxide (CoO)	7.5	2.6
Manganese Oxide (MnO_2)	1.0	0.3
Total	291.4	

The loss, theoretically, on smelting is plainly 317.5 — 291.4 = 26.1 lb. or 26.1 ÷ 317.5 = 8.2 per cent. (317.5 lb. = original weight of batch.)

*From a paper printed in the October Journal of the American Society of Mechanical Engineers.

†President and general manager, the Enameled Pipe & Engineering Company, Elyria, Ohio.

Chemicals for Different Colors

The production of a good white enamel either for cast-iron or sheet-steel work may be said to depend, at the present time, upon the use of tin oxide. Great have been the efforts to substitute less expensive substances, such as compounds of antimony and lead. But an antimony white which looks good alone is plainly seen to be off-color when compared with a good tin oxide white.

There is any number of formulæ for black enamels, but when the results are closely compared we find that the colors range widely through brown blacks, blue blacks, purple blacks, etc. Certain compounds of manganese and iron used together give a color approaching black. Other formulæ call for the combined use of oxides of manganese, cobalt and copper. Again we find oxide of nickel added to the above three oxides.

A color much seen in enamels is blue and the use of cobalt is very satisfactory in the production of this color in various grades of intensity. Manganese alone produces purples and violets and in combination with cobalt gives various shades of purple-blue.

Green enamels are chiefly produced by the use of chromium oxide and copper oxide, while in some cases a mixture of copper and cobalt oxide is used.

Reds of various shades are produced by the use of red oxide of iron. In connection with it we find that tin oxide aids greatly in giving opacity and bringing out the color. In the production of brown enamels we may use ferrous chromate. Various yellows are produced by salts of cadmium, chromium and uranium.

Aluminum and the Future of Enameled Ware

So far as the cooking ware industry is concerned, the field is practically constant. Granting that the demand for that class of article is increasing, as the public becomes accustomed and educated to its use, there is an opposing tendency in the rapidly increasing use of aluminum ware. Exactly how these and other factors now balance would be difficult to ascertain. But aluminum is a metal and its metallic properties cannot be denied. Under certain conditions it is attacked by various substances used in the culinary arts and a contamination of the preparation is inevitable. No doubt the time will come when a high silica enamel known to be free from tin and other poisonous compounds will enter the cooking ware field. The government is becoming more and more careful in protecting the public from foods of injurious nature and it is not too much to expect that soon it will establish more rigid restrictions relative to the ingredients entering into the manufacture of apparatus in which food is to be prepared. At such a time an enamel coming up to requirement will be free from injurious compounds and will come into great demand.

In the preparation of foods on a factory scale, we find an enormous and constantly increasing demand for larger pieces of enameled steel apparatus in the form of pans, kettles, tanks, pipe, etc. There are many lines of pressure being brought to bear both by the government and public opinion which lead to the conclusion that the increasing demand for this style of apparatus is without limit. Canning and preserving factories and dairy establishments have found a large use for copper and tin in the construction of containers, vacuum pans, etc. The acids of fruit juices and vegetable pulps have a very marked action on these metals and the resulting contamination of the product is known to be of danger to the consumer. The use of an enamel containing tin, lead or other metallic oxides is but the first step in the right direction. The presence of these metallic oxides in the enamel renders it corrodible and contamination results. The solution is the use of an acid-proof enamel free from all such poisonous substances. In the milk industry a similar line of reasoning applies. Further compare the ease of maintaining sanitary conditions in a one-piece enamel lined unit with the trouble experienced in the use of a metal container or even an enameled article made up of composite parts between which are gaskets.

Another consideration relates to the preparation of chemicals later used in food products, for instance, baking powder. Many operations connected with the manufacture of such products have been carried on in lead or other metallic pans and the resulting contamination has

S. DIESCHER & SONS
Mechanical and Civil Engineers,
PITTSBURGH, PA.

given no end of trouble. Acid-proof enamel is rapidly solving this problem also.

Not only does steel apparatus meet the demands of modern industries, but in case a cheaper product is desired and at the same time a heavier construction is permissible, acid-proof cast-iron apparatus has its field. The possibility for size and variety of construction is, of course, more limited than in the case of sheet-steel apparatus. We predict that in their ultimate stage of development the enamel industries will be ranked among the greatest of commercial activities.

Economies in Running the Boiler Fire*

Special Reference to Some Tried Modifications with a Chain Grate

—— BY WILLIAM M. FABER† ——

The man with the shovel (not too large a shovel) is told by the expert to fire in a manner called the "coking method," and if the man is reasonably intelligent he soon finds that he is putting the coal through a cycle of operations by which the volatiles are first distilled and driven off, largely by radiant heat from the side walls and arch (if it is an extension furnace), and from the incandescent fuel farther within the furnace; burning the resultant coke by a proper admixture of air through the grate bars and finally riddling the ashes into the ash pit at the middle and back section of the furnace, when the grates are as they should be for this method of firing, of the sectional agitating or shaking type.

By this method of firing it is possible to get a high furnace efficiency, but it only applies to furnaces equipped with non-automatic grates where hand firing is practiced. Even in plants thus equipped we have trouble because the fireman seldom follows the instructions given to him and soon gets back to his old method of firing which, in most cases, is what is called the spreading system of firing. This is a good method if properly followed out, but as usually done, it is a source of great waste of fuel, because the fireman persists in firing five or six shovels of coal where three would have done very much better, presumably so that he might sit down between firings for 15 or 20 min.

Fundamentally, it seems to me, the idea of the chain grate stoker is correct. It carries the coal through the same cycle that the intelligent fireman does when he uses the coking method on a flat grate, and if we could only control the air supply more perfectly and hold the fuel on the grate long enough to insure a thorough burning out, its efficiency would be greatly improved. When chain grate stokers are used, we have come to appreciate that there are certain requirements as regards the physical condition of the coal, aside from its thermal qualifications that we must consider and provide means for obtaining; an important one being, proper and approximately uniform size of the coal that comes to us either as slack from the mines, or from our crushing plants when run-of-mine is used. Formerly when run-of-mine coal had to be crushed we considered it in good condition when 85 to 90 per cent. would pass through a 1¼ x 1¼-in. mesh screen, but at the present time we are dissatisfied with this condition of the coal for our stokers, and are endeavoring to get our crushers to crush the coal so that 85 to 90 per cent. will pass through a ¾ x ¾-in. screen. These changes in the mere matter of the sizes of the lumps of coal that make it fit for chain grate stokers have been brought about by the attention that seems to be paid everywhere to the combustible in the ash that is discharged from the chain grate stoker.

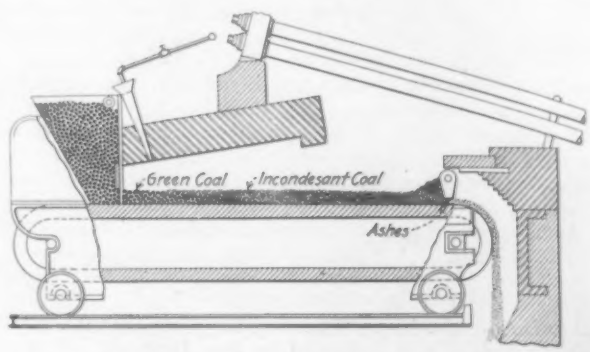
Some years ago we appreciated the great loss in unburnt coal thrown away in the ashes, the percentage of the combustible in the ash ordinarily running as high as 35 to 55 per cent. An attachment was designed to hold this partly burnt-out fuel in the boiler furnace after it had left the chain grate. The partly burnt-out coal was thrown over into an auxiliary furnace grate where it was kept until thoroughly burnt out, when the ashes were delivered into the ash pit by the action of a clinker bar driven from the stoker drive. Unfortunately, after two or three promising attempts this effort at improvement was abandoned.

To provide a sufficient air supply under the ignition arch when a coking coal is used, the method of introducing air as shown in the illustration has been used with reasonably good success. Primarily, the introduction of air at this point was used to prevent smoke when using certain grades of coal that coked readily, and the results seemed so promising that tests were made of resultant gases, both with and without the blower. These results are as follows:

	With blower	Without blower
Draft	0.40 in.	0.42 in.
CO_2	10.4 per cent.	9.9 per cent.
O	8.4 per cent.	8.8 per cent.
CO	0.0 per cent.	0.0 per cent.

From careful samplings of the ashes discharged from chain grate stokers in a number of boiler houses, we have found that the percentage of combustible averages from 40 to 50 per cent. We think this average combustible should be cut down to an average of 15 to 20 per cent.; this means in a boiler house that uses 50,000 tons of coal per year of 12 per cent. average ash that there would be a saving of some 1500 tons of coal.

Notwithstanding the fact that we are accomplishing a great deal by getting more uniformity in the size of the coal that comes from our crushers, we are going a step farther in providing our chain grate stoker furnaces with a water back of improved design. This water back is shown



Scheme for Admitting Air and Holding Partly Burned Fuel in a Chain Grate Stoker

in the cut. It is hung on trunnions so that it may swing easily when large pieces of clinkers have to be discharged from chain grate into the ash pit; ordinarily, this water back when hanging vertically is set from 1 in. to 1½ in. above the chain grate stoker, and when coals that do not clinker badly are used, it acts as a skimmer, allowing the thoroughly burnt-out ash to be discharged into the ash pit, holding the balance of the more or less burnt-out fuel until it has time to be consumed. Results of tests on stokers equipped with this improved water back have shown a saving of 3 per cent. over stokers with the older type.

The standards of boiler furnace efficiencies must be established by the minimum amount of combustible left unconsumed that it is practicable to get by simple devices that will have great durability and that are effective for the particular purposes used; by the maximum possible amount of carbon dioxide without the ever-present danger of loss through lack of air supply, resulting in incomplete combustion, and a more or less high percentage of carbon monoxide and unconsumed hydrocarbons, also by a minimum radiation through the walls of the furnace itself.

The best practice has shown that when using the grades of coal mentioned, that 12 to 13 per cent. of carbon dioxide and 15 to 20 per cent. combustible in the ash are good averages to strive for in continuous practice.

Discussion of the Paper

Joseph Harrington in the discussion of the paper said that recent experiment in quite a number of installations has developed a design of arch which he has termed the reflecting arch. This is a long inclined arch so placed that the heat from the rear or incandescent portion of the fuel bed is directly reflected to the incoming fuel at the gate. It is quite possible to place this arch so that the maximum amount of reflection shall take place. Its hight and inclination, moreover, render it possible to utilize for ignition purposes, the direct radiation from the face of the bridge wall. This is no inconsiderable part of the program, it

*From a paper read before the Cleveland Engineering Society.
†Engineer, American Steel & Wire Company, Cleveland, Ohio.

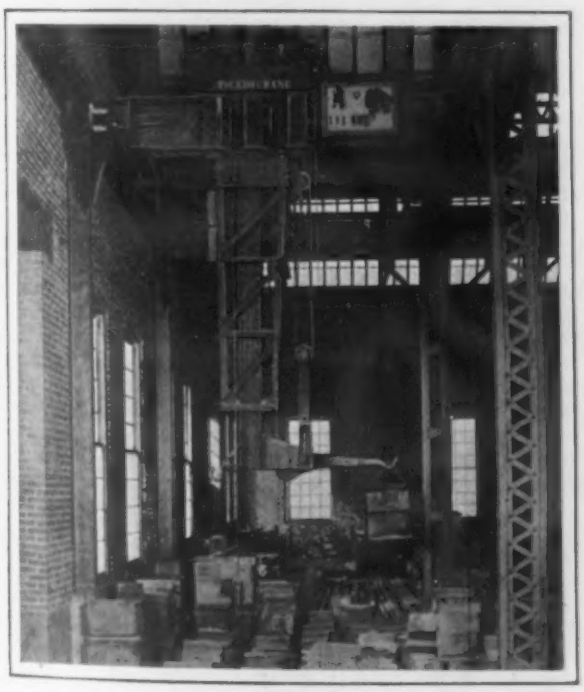
being of the utmost value even though it may be anywhere from 9 to 12 ft. away from the gate.

Satisfactory ignition with grate speeds up to 10 or 12 in. a minute, he said, can readily be attained, which corresponds to a rate of combustion exceeding 50 lb. per square foot. These high rates of combustion can only be attained with fuel bed thicknesses which will permit of the application of high draft. As the fuel bed thicknesses increase by virtue of increased furnace draft, greater extraction of oxygen can be accomplished, so that with other conditions the same, gas analyses of increasing merit can be secured. A high furnace draft, however, is accompanied in the usual setting by increased infiltration so that the result under ordinary conditions is not all beneficial.

He expressed himself as a strong advocate of the use of recording instruments in the boiler room. The use for example of a recording draft gauge in the furnace, he said, will indicate every time the operative opens the inspection door and the time that it is open. It will tell whether or not he has allowed the fire to burn short or to acquire a bank. It will tell whether he is feeding his fuel too heavy or too light, and if this is backed up by a CO_2 chart and damper draft with a recording thermometer in the uptake, the man in the office the day after, can tell what the conditions were in his boiler room far better than he could had he lived in that boiler room through the entire previous day without the use of these instruments.

A Special Crane for Handling Hammer Dies

A special crane, which is the only one of its type in operation, has been designed and built by the Toledo Bridge & Crane Company, Toledo, Ohio, for handling the dies used in the drop forge plant of the National Supply Company to and from the hammers. The construction of the crane proper, that is the trolley, the crane girders and the bridge operating mechanical parts are practically the same as on any standard three-motor floor operated



A Special Type of Crane Designed for Handling Forging Dies to and from the Hammers

crane, but the die handling mechanism is of a special design and is adapted particularly to this service. With this type of crane it is possible to handle dies weighing as much as 5 tons with only the crane or hammer operator.

The vertical arm or plunger to which the hoisting hook is attached is raised and lowered through hoisting cables and is held in position by roller guides in the structural frame. This hook, which is made of either forged steel or annealed cast iron, is built after a special design with a counterbalance, so that when the crane is not in operation the hook drops back to a vertical position. An auxiliary hook is provided, thus enabling the crane to be used for ordinary service.

Interesting Development of Portable and Stationary Oil Heaters

For use in roundhouses, the Hauck Mfg. Company, Brooklyn, N. Y., has brought out a portable steel tire heating outfit. It can use crude, fuel and kerosene oils and the

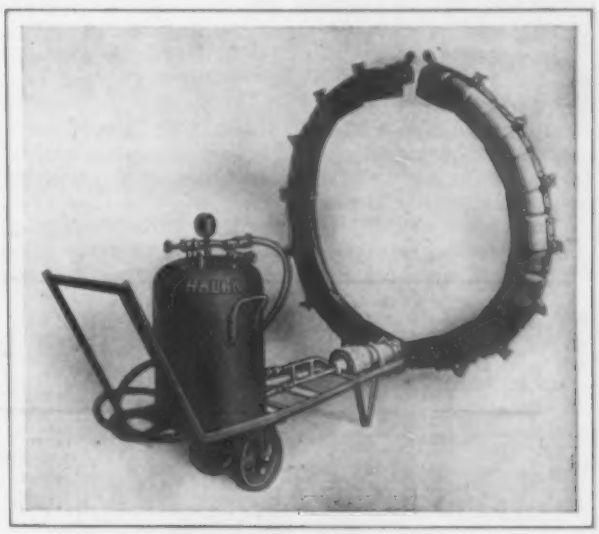


Fig. 1—A Recently Developed Portable Heater for Expanding Locomotive and Railroad Car Ties

tire casing can be adjusted to fit tires ranging from 33 to 96 in. in diameter, thus adapting it for use with all of the sizes of wheels ordinarily employed in railroad work. In addition to the portable type, the company has also brought out a stationary heater.

In Fig. 1 is shown the portable heater. It has a flexible casing, made up of a number of sectional interchangeable steel segments. These segments are adjusted to accommodate the diameter of tire by manipulating the fastenings at the joints. The tire is placed in the casing and the heat applied through the burner at the bottom. The flame passes around the tire inside the casing which is left open at the top to allow the escape of heat and gases.

The stationary type of tire heater, illustrated in Fig. 2, consists of one of the builder's oil burners of a special type placed in the center of a nest of tires to be heated.

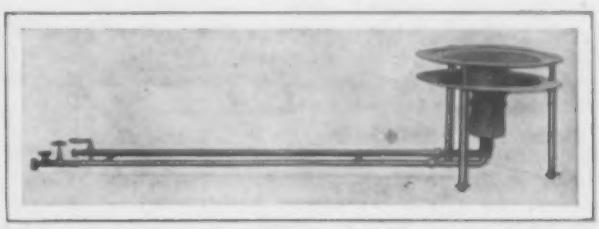


Fig. 2—The Stationary Type for Heating Several Sets of Tires at Once

This burner can be lighted and the flame adjusted to suit the conditions. The flame is directed against the internal diameter of the tires, to heat them quickly and evenly.

Liquid air may be used for the production of tremendously powerful explosives, according to a lecture by George Claude, delivered before the recent congress on refrigeration in Chicago. He stated that while carbon, immersed in liquid oxygen and set on fire in the open air, burns slowly, the same material confined in a cartridge, and acted on by a fulminate, explodes with the violence of dynamite. He dwelt also on the liquefaction of air for the production of oxygen, for such commercial uses as the welding and cutting of metals, etc.

The headquarters of the Southern department of Fairbanks, Morse & Co., of which E. D. West is manager, have been moved from Chicago to Atlanta, Ga. This will greatly facilitate the handling of the company's large Southern business. Sales offices will be maintained at New Orleans, La.; Jacksonville, Fla.; Atlanta, Ga.; Richmond, Va. At each of these points a large stock of engines, electrical machinery, pumps, etc., will be carried for prompt shipment.

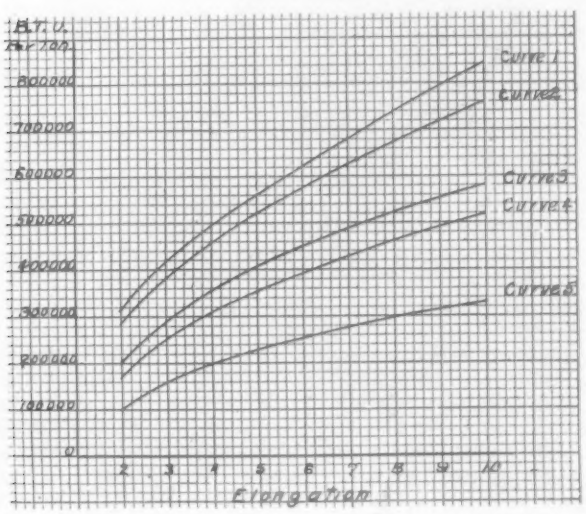
The Electric Drive for Rolling Mills*

Comparison with Works Using Steam Engines—List of Gas Power Plants

BY BRENT WILEY

A 10,000 kw. 3-phase 25-cycle 2200-volt or 6600-volt gas-engine-driven power station, complete in all details, costs approximately $90 per kw. installed, on the basis of maximum rating of the unit. Power can be generated for a total cost of approximately ½ cent per kw. hr. total charge, figured on 60 per cent. load factor and 25 per cent. spare capacity. In this case the gas is charged to the station on the basis of equivalent coal value, figured approximately $2 per ton fired.

The energy obtained from the blast furnace gas when used in the engine direct is approximately three times greater than when burned under the boilers, and it is this



Heat units required per ton for rolling blooms or billets in reversing Mill at Full Capacity. Curve No. 1—Steam Drive Saturated Steam Condensing 130 Lbs. 26 In. Vacuum. Curve No. 2—Steam Drive Superheated Steam 80 Deg. Fahr. 130 Lb. 26 In. Vacuum. Curve No. 3—Electric Drive Turbine Driven Generators Steam 150 Lbs. 100 Deg. Fahr. Superheat 28 In. Vacuum. Curve No. 4—Steam Drive Combined with Exhaust Steam Turbine 130 Lbs. 80 Deg. Fahr. Superheat 28 In. Vacuum. Curve No. 5—Electric Drive Gas Engine Driven Generators

one point that makes possible the low generating cost of power. For every 100 tons of pig iron produced in 24 hr. there is sufficient gas to operate a 2000-hp. engine in excess of that required by the blowing engine, gas cleaning apparatus and other auxiliaries.

Where the item of first cost is of particular consideration, the steam turbine offers advantages and, compared to the reciprocating steam engine, is much more economical in operation. The cost of a 10,000-kw. AC. 25-cycle station, equipped with all necessary auxiliaries and complete with building would be approximately $55 per kw. on the basis of maximum continuous capacity of the station and 25 per cent. spare capacity. Power can be generated for approximately 7/10 cent per kw. hr. with a load factor of approximately 60 per cent. with coal figured at $2 per ton fired. Thus the first cost of installation of the turbine station would be approximately 60 per cent. of the gas engine station, and the operating cost approximately 40 per cent. more.

The most economical arrangement of power plant, considered from the standpoint of operating cost, is a combination of gas engine and steam turbine unit, with the approximate ratio of 2:1 respectively. In the case of motor driven steel mills, the load is a very fluctuating one and the turbine acts as a flywheel to the system, taking the abnormal peak loads and thus permitting the gas engine to operate on a fairly average load. This increases their service capacity materially.

The fourth plan of economy is to install low-pressure steam turbines and in many existing plants there is considerable quantity of exhaust steam from power and mill engines which can be used as a power supply for this type of power unit. Many installations of this character are operating to-day with excellent results, and in general it can be stated that the net return from such an installation is 30 to 40 per cent. annually. The greatest economy is obtained by the use of the low-pressure turbine, in combination with a non-condensing engine, in which the excess power obtained is practically equal to that generated by the engine, without increasing coal consumption. However, in the case of a condensing engine, it is usually found that the valves can be reset to permit the engine to develop its full rated horsepower, and also to exhaust at approximately atmospheric pressure, and by increasing the coal consumption 35 per cent. additional power to the extent of 75 per cent. can be obtained.

Referring to the subject of the gas engine and turbine power stations, the question is often asked—whether it is more economical to use steam engines on the mills direct with electric power for the auxiliaries or whether electric drive can be used universally to an advantage. There are two factors which are decidedly in favor of the latter proposition. In every steel plant there is an auxiliary motor load, which requires the furnishing of considerable electric power, and to provide power for the rolls merely means an extension of the electric power plant, which can be made at a very reasonable figure. With the increase of power generated follows the reduction of operating cost per unit. Furthermore, the steam economy of steam engines operating on extremely fluctuating loads is very low as compared with that of the turbine station, as for instance, in the case of a 3-high plate mill, where the average load is approximately 25 per cent. of the normal rating of the driving unit. The steam economy of a condensing engine, 75 to 100 r.p.m., 2000 to 3000 hp., at 25 per cent. normal rating is approximately 28 lb. per hp. hr. at 26 in. vacuum and 150 lb. steam pressure. On the other hand, if power was supplied from a central electric station, where the fluctuations would be small, as compared with the fluctuations of the steam engine driving a particular mill, the steam economy would undoubtedly be as good as 15 lb. per indicated horsepower hour. However, in order to cover these points in a more specific way, a particular case will be discussed in detail and will include cost of installation, overhead charges, maintenance, and all other items pertaining to the total operating cost per ton of produce.

There has been considerable discussion concerning the advisability of using electric drive for reversing mills in this country. Regarding the question of first cost, it can be stated that for the average equipment the cost of the reversing motor and necessary motor generator, flywheel equalizer set, with control is approximately the same as is the cost of the reversing engine complete and boiler plant. If power is being purchased these are all the items of first cost necessary to consider and if the steel company furnishes its own power, then there would be an additional cost to the power plant of approximately one-half the capacity of the normal rating of the mill motor.

In regard to the operation, the electric drive is more economical than the steam engine, and from a power standpoint this is illustrated in the curves given in the cut. These curves are based on actual mill test data, on the basis of rolling ingots to blooms or billets and the equipment are of the most recent improved design.

When the installation of a blooming mill or other reversing mill is being considered in conjunction with other mills in particular, it is very important that all the factors be figured definitely. In the majority of cases, the first cost will not be found prohibitive, and with coal at $1.70 to $2 per ton fired, the saving in operation of the electric driven mill yields a very substantial return for the additional investment required, or if power is purchased, say at approximately ¾ cent per kw. hr. the saving would be decidedly in favor of the motor equipment.

There are other advantages that are very convincing, especially to those who have had experience with reversing electric drive, being saving in stores, oil, water packing, less breakage of mill parts, less attendance and better product of mill. The reversing blooming mill is just being tried in this country, and as the results are very

*From a paper entitled "Present Status of Motor Drive for Main Rolls of Steel Mills," presented to the Association of Iron and Steel Electrical Engineers. Incorporated in the paper also was an elaborate table of the electrically operated reversing mills in Europe, United States and Canada, giving numerous details; a partial list of motor-driven non-reversing mills in Europe and a list of motor operated steel mills in the United States and Canada. The author is identified with the Westinghouse Electric & Mfg. Company.

gratifying undoubtedly more installations will be added to the list in the near future.

Efficiency of Motor Drive on Main Rolls

To illustrate the efficiency of the electric drive for the main rolls, a comparison is made regarding the first cost and the cost of operation of motor and steam engine drive, motors being used for the auxiliaries in each case. The plant conditions are as follows: Steel plant new and to consist of

1—40-in. blooming mill (reversing).
1—Sheet bar mill (3-high).
1—72-in. plate mill (3-high).
1—Sheet jobbing mill (non-reversing).

The auxiliary motors will require 1200 kw. average and 1800 kw. maximum. Steam pressure 150 lb., average vacuum 26 in. for steam engines and 28 in. for turbines. Price of coal $2 per ton fired. Electric power is generated from turbine units and is 3-phase 25-cycle 2200-volt and 230-volt direct current will be used for the majority of the auxiliary motors. For mills with steam engine drive, total cost of electric power for auxiliaries is estimated at 0.75 cent per kw. hr. and for all electric drive at 0.6 cent per kw. hr. as the amount of electric power generated is greater and load factor will be higher.

40-in. Blooming Mill.—Ingots 20 x 22 in. bottom and 18 x 20 in. top, weighing approximately 6890 lb., rolled to blooms of average size of 6 x 7 in. (or equivalent section), with elongation of 10 to 1 in 15 passes; the average working conditions 70 tons per hour.

Bar Mill.—Blooms 6 x 7 in., weighing 750 lb., rolled to 7 x ¾ in. bar, elongation 16 to 1, in 15 passes. The average tonnage is 50 tons per hour. The speed of the mill is 60 r.p.m.; diameter of the rolls 22 in.

72-in. Plate Mill.—This mill consists of two stands of rolls. Average slab of 3 x 30 x 48 in., weighing 1200 lb., rolled to 62 x 200 in., No. 12 gauge sheet in 17 passes. Average tonnage 8 tons per hour.

Jobbing Mill.—This mill consists of two stands of roughing rolls and two stands of finishing rolls. Bars 7 x ¾ in., 50 lb. weight—rolled to 30 x 60 in., No. 10 gauge sheets. The capacity of the mill is approximately 12 tons per hour. The speed of the mill is 40 r.p.m.

Cost of Installation of Steam Engine Drive

40-In. Blooming Mill (Reversing):	
One compound condensing engine, erected with condenser and piping, building, etc., complete in all details	$140,000
Bar Mill:	
One 2000-hp. condensing engine, erected complete with condenser, piping, etc., including building and all details	$70,000
Plate Mill:	
One 2000-hp. condensing engine, erected complete with condenser, piping, etc., including building and all details	$70,000
Jobbing Mill:	
One 1200-hp. condensing engine, erected complete with condenser, piping, including building and all details	$50,000
Electric Power Station for Auxiliary Motors:	
Three 1500-kw. turbo units—complete with all details.	
Two 750-kw. motor generator sets, transformers, exciters, switchboard, etc., condensers, piping, building, complete with all details installed	$163,600
Boiler Plant for all the Above Equipment:	
6000 boiler horsepower complete with building, coal handling and ash handling equipment, pumping station, at $35	$210,000
Grand total	$703,600

Steel Mill Power Installations in the United States Using Blast-Furnace Gas and Coke Oven Gas

Location of plant	Company	Date of Installation	Use of power	Fuel	Make of engine	H.P. of each unit	Number of units	Total horsepower
ILLINOIS:								
Joliet	Illinois Steel Co.	1912	Electric power for mills, furnaces, etc.	Blast-furnace gas	Allis-Chalmers	4,300	Three	12,900
So. Chicago	Illinois Steel Co.	1907-8	Electric power for mills, furnaces, cement plants, etc.	Blast-furnace gas	Allis-Chalmers	3,500	Four	14,000
So. Chicago	Illinois Steel Co.	1910-11	Blowing blast furnaces	Blast-furnace gas	2 Snow 2 Allis-Chalmers 2 Bethlehem	3,600 2,200 2,200	Six	16,000
INDIANA:								
Gary	Illinois SteelCo.	1908	Electric power for mills, furnaces, etc.	Blast-furnace gas	Allis-Chalmers	3,875	Nine	34,875
Gary	Illinois Steel Co.	1908	Blowing blast furnaces	Blast-furnace gas	Westinghouse	2,900	Eight	23,200
Gary	Illinois Steel Co.	1909	Electric power for furnaces, mills, etc.	Blast-furnace gas	Allis-Chalmers	3,875	Eight	31,000
Gary	Illinois Steel Co.	1909	Blowing blast furnaces	Blast-furnace gas	Allis-Chalmers	3,500	Eight	28,000
Gary	Illinois Steel Co.	1911	Electric power for mills, furnaces, etc.	Blast-furnace gas	Allis-Chalmers	4,300	Six	25,800
Gary	Illinois Steel Co.	1912	Electric power for mills	Blast-furnace gas	Allis-Chalmers	4,300	Four	17,200
NEW YORK:								
Lackawanna	Lackawanna Steel Co.	1900-1905	Electric power for blowing engines	Blast-furnace gas Blast-furnace gas	Koerting 2-cy'le Koerting 2-cy'le	1,000 2,000	Eight Sixteen	8,000 32,000
OHIO:								
Cleveland	Amer. Steel & Wire Co. (Cent'l furnaces)	1908	Elec. pr.; four 1,180-KW A.C. generators, 25 cycle, 3 phase, 13,200 volts	Blast-furnace gas 90 B.t.u. per cu. ft.	Allis-Chalmers	2,250	Four	9,000
Cleveland	Amer. Steel & Wire Co. (Cent'l furnaces)	1911	Blowing furnaces; each engine at 60 r.p.m. has a capacity of 40,000 cu. ft. of free air per minute	Blast-furnace gas 90 B.t.u. per cu. ft.	Allis-Chalmers	3,900	Two	7,800
Youngstown	Carnegie Stl. Co. (Ohio Works)	1908	Driving A.C. generator	Blast-furnace gas 90 B.t.u. per cu. ft.	William Tod	1,740	One	1,740
Youngstown	Carnegie Stl. Co. (Ohio Works)	1909	Blowing blast furnaces	Blast-furnace gas 90 B.t.u. per cu. ft.	William Tod	3,500	Four	14,000
Youngstown	Carnegie Stl. Co. (Ohio Works)	1909	Driving A. C. generators	Blast-furnace gas 90 B.t.u. per cu. ft.	Snow	3,600	Four	1,440
PENNSYLVANIA								
Bessemer	Carnegie Stl. Co. (Edgar Thompson Works)	1907	Blowing blast furnaces	Blast-furnace gas 90 B.t.u. per cu. ft.	Westinghouse	2,040	Two	4,080
Bessemer	Carnegie Stl. Co. (Edgar Thompson Works)	1907	Driving D.C. generator	Blast-furnace gas 90 B.t.u. per cu. ft.	Westinghouse	2,820 1,750	One One	2,820 1,750
Bethlehem	Bethlehem Steel Company	1910	Electric power for mills	Blast-furnace gas	Bethlehem steel	2,000	Three	6,000
Bethlehem	Bethlehem Steel Company	1913	Electric power for mills	Blast-furnace gas	Bethlehem steel	3,675	Three	11,025
Duquesne	Carnegie Stl. Co. (Duquesne Works)	1910	Blowing blast furnaces	Blast-furnace gas 90 B.t.u. per cu. ft.	Snow	2,310	Four	9,240
Duquesne	Carnegie Stl. Co. (Duquesne Works)	1910	Driving A.C. generators	Blast-furnace gas 90 B.t.u. per cu. ft. Coke oven gas when available; prod. gas at other times	Snow Westinghouse	3,600 500	Two One	7,200 500
Lebanon	Amer. Iron & Stl. Mfg. Co.	1906	Electric. 250-volt direct current distributed to motors throughout the mill for driving machinery	Blast-furnace gas taken from any or all of the 4 blast furnaces at the works	Allis-Chalmers	1,500	Two	3,000
McKeesport	National Tube Co.	1907	Blowing blast furnaces	Blast-furnace gas	Allis-Chalmers	3,500	Four	14,000
Rankin	Carnegie Stl. Co. (Carrie Furnaces)	1908 1909 1911	Driving A.C. generators	Blast-furnace gas	Allis-Chalmers Allis-Chalmers Bethlehem	3,500 3,500 3,600	Four Three Two	14,000 10,500 7,200
Steelton	Penna. Steel Co.	1910	Blowing engine	Blast-furnace gas	Allis-Chalmers	2,250	One	2,250
WISCONSIN:								
Milwaukee	Illinois Steel Co.	1907	Electric power for mills, furnaces, etc.	Blast-furnace gas	Allis-Chalmers	985	One	985
MINNESOTA:								
Duluth	Minnesota Stl. Co.	1912	Electric power for mills	Blast-furnace gas	Allis-Chalmers	4,300	Four	17,200

Cost of Operating Plant with Steam Engine Drive on Main Rolls

40-In. Blooming Mill:

Average monthly tonnage 40,000 tons.
Yearly tonnage 480,000 tons.
Steam consumption 700 lb. per ton, rolling 6 x 7-in. blooms in 15 passes = 480,000 × 700 = 336,000,000 lb. steam.
Evaporation 7 lb. steam per lb. of coal.
Fuel consumption = 24,000 *tons per year.
Add 10 per cent. for leakage and condensation = 2400 tons per year.

Total	26,400 tons
Coal at $2 per ton fired	$52,800
Engine and oiler, total, 50 cents an hour, 6000 hr. per year	3,000
Maintenance, 4 per cent. on $120,000 (cost of engine and condenser)	1,500
Lubricants and supplies	4,800
Depreciation, insurance, etc., 6 per cent. (on $120,000)	7,200
Interest on investment ($140,000), 5 per cent	7,000
Power for condenser pumps	1,000
Total yearly operating cost	$77,300

Bar Mill:

Net rolling work, 18 b. hp. hr. per ton rolled 6 x 7-in. bloom to 7 x ¾-in. bars, 50 tons per hour, yearly production (6000 hours), 120,000 tons.

Friction load of mill	250 hp.
Production 50 tons per hour at 18 hp. per ton average gives load	900 hp.
Average load on engine	1150 hp.
Steam consumption 22 lb. per b. hp.	
Steam consumption total 1150 × 22 × 6000 =	151,800,000 lb.
Fuel consumption, evaporation, 7 lb. =	10,626 tons
Add 10 per cent. for leakage, condensation, etc	1,063 tons
Total for year	11,689 tons
Coal at $2 per ton fired	$23,378
Engineer, 6000 hr. at 30 cents an hour	1,800
Oiler, 2000 hr. at 20 cents an hour	400
Maintenance, 4 per cent. (on $60,000)	2,400
Stores, including oil, waste, etc	550
Depreciation, insurance, etc., 6 per cent. (on $60,000)	3,600
Interest on investment ($70,000), 5 per cent	3,500
Power for condenser pump	500
Total yearly operating cost	$36,128

72-In. Plate Mill:

The net rolling work is 40 b. hp. hr. per ton, rolling 3 x 30 x 48-in. slabs to No. 12 gauge sheets.

Production, 120 tons in 20 hr., average, 6 × 40	240 hp.
Friction	300 hp.
Average load	540 hp.
Steam consumption, 2000-hp. engine, full load, 15 lb., and 29 lb. at 540 hp.	
Steam consumption, 540 × 29 × 6000 = 94,000,000 lb. per year.	
Fuel consumption, evaporation 7 lb.	6700 tons
Add 10 per cent. for leakage and condensation, etc	670 tons
Total per year	7370 tons
Coal at $2 per ton fired	$14,740
Engineer and one-third of oiler's time	2,200
Maintenance at 4 per cent. (on $55,000)	2,200
Stores, etc	600
Depreciation, insurance, etc., at 6 per cent. (on $60,000)	3,600
Interest on investment ($70,000), 5 per cent	3,500
Power for condenser pumps	600
Total yearly operating cost	$27,440

Jobbing Mill:

Net rolling work, 70 b. hp. hr. per ton rolling No. 10 gauge.

Production, 240 tons in 20 hr.	
Average power, 12 × 70 =	840 hp.
Friction	250 hp.
Average load on engine	1090 hp.
Steam consumption, 17 lb. at 1090 b. hp.	
Steam consumption 1090 × 17 × 6000 = 111,180,800 lb. per year.	
Fuel consumption, evaporation, 7 lb.	8000 tons
Add 10 per cent. for leakage and condensation	800 tons.
Per year	8800 tons
8800 tons at $2 fired	$17,600
Engineer and one-third oiler's time	2,200
Maintenance at 4 per cent (on $40,000)	1,600
Stores, including oil, waste, etc	400
Depreciation, insurance, etc., 6 per cent. (on $45,000)	2,700
Interest on investment, 5 per cent. (on $50,000)	2,500
Power for condenser pump	400
Total yearly operating cost	$27,400

Electric Power Plant for Auxiliary Motor:

Power can be generated for $0.75 per kw. hr. for condition of this plant, although this figure is generously high.

Average load on lines, 1200 kw., 7,200,000 kw. hr. per year at $0.75 = per year	$54,000

Total Yearly Cost of Operation (Steam Engine Drive)

Blooming mill	$77,300
Bar mill	36,128
72-in. plate mill	27,440
Jobbing mill	27,400
	$168,268
Electric power for auxiliaries	$54,000

Boiler Plant:

Maintenance, 6 per cent.
Depreciation, insurance, etc., 7 per cent.
Interest, 5 per cent.

Total interest, 18 per cent. on $210,000	$30,240

(As boiler plant charges are included in charge of 0.75 cent per kw. hr. for electric power for auxiliaries, only 80 per cent. of total b. hp. charge should be included in total operating cost.)

Total cost of operation per year	$252,508

Cost of Installation of Motor Drive with Power Plant

40-In. Blooming Mill:

One motor equipment installed complete with flywheel equalizer set, building, etc	$175,000
Bar Mill:	
One 2000-hp. 240-r.p.m. motor installed complete, with controller, etc., including building	$35,000
One gear drive installed	$15,000
72-In. Plate Mill:	
One 2000-hp., 240-r.p.m. motor installed complete with flywheel, controller, etc., including building	$33,000
One gear drive installed	$15,000
Jobbing Mills:	
One 1200-hp., 240-r.p.m. motor installed complete with flywheel, controller, etc., including building	$22,000
One gear drive, installed	$10,000
Electric Power Plant for Motors of Main Rolls and Auxiliary Drives:	
Three 3500-kw. turbo units.	
Two 750-kw. motor generator sets—transformers, exciters, switchboard—installed complete; condensers, transmission lines, building, etc	$323,000
Boiler Plant for all the Above Equipment:	
4500 b. hp., complete with building, coal handling and ash building equipments, pumping station, etc., at $35	$157,500
Total cost of all electric drive	$785,500
Excess cost of all electric drive	$81,900

Cost of Yearly Operation—All Electric Drive

Blooming Mill:

Power at generator, 70 tons per hour, 23 kw. hr. (input to motor) per ton.
Yearly power consumption = 70 × 6000 × 23 = 9,660,000 kw. hr.
Power at switchboard; allowing 3 per cent. line loss = 10,000,000 kw. hr.

10,000,000 kw. hr. at 0.6 per cent. =	$60,000
Maintenance, 1 per cent. on $175,000	1,750
Oil, waste, etc	250
Attendance	1,800
Depreciation, insurance, etc., 4 per cent. on $150,000	6,000
Interest on investment ($175,000), 5 per cent	8,750
Total yearly operating cost	$78,550

Bar Mill:

Power at 50 tons per hour, 14 kw. hr. per ton.
Net work = 15.6 kw. hr. input per ton.
Yearly power consumption 50 × 6000 × 15.6 = 4,680,000 kw. hr.
Allowing 3 per cent. line loss—power at switchboard = 4,800,000 kw. hr.

4,800,000 kw. hr. at 0.6 cent	$28,800
Maintenance, 1 per cent. on $50,000	500
Oil, waste, etc	100
Attendance	850
Depreciation, insurance, etc., 4 per cent. on $50,000	2,000
Interest on investment ($50,000), 5 per cent	2,500
Total yearly operating cost	$34,750

72-In. Plate Mill:

Power required, 6 tons per hour; 540 b. hp. = 460 kw. input average.
Allow 3 per cent. transmission less = 474 kw. at switchboard.

474 × 6000, or 2,844,000 kw. hr. at 0.6 cent =	$17,064
Maintenance, 1 per cent. on $48,000	480
Oil, waste, etc	100
Attendance	900
Depreciation, insurance, etc., 4 per cent. on $48,000	1,920
Interest on investment ($48,000), 5 per cent	2,400
Total yearly operating cost	$22,864

Jobbing Mill:

Power required at 12 tons per hour; 1090 b. hp. = 900 kw. hr.
Allow 3 per cent. transmission loss = 930 kw. hr.
Yearly power consumption, 930 × 600 = 5,580,000 kw. hr.

5,580,000 kw. hr., at 0.6 cent	$33,480
Maintenance, 1 per cent. on $32,000	320
Oil, waste, etc	100
Attendance	750
Depreciation, insurance, etc., 4 per cent. on $32,000	1,280
Interest on investment ($32,000), 5 per cent	1,600
Total yearly operating cost	$37,530
Electric Power for Auxiliaries:	
1200 kw., 6000 hr. at 0.6 cent	$43,200

Total Yearly Cost of Operation (Motor Drive)

Blooming mill	$78,550
Bar mill	34,750
72-inch plate mill	22,864
Jobbing mill	37,530
	$173,694
Electric power for auxiliaries	43,200

Boiler Plant:

Maintenance, 6 per cent.; depreciation, insurance, etc., 7 per cent.; interest, 5 per cent.; total interest, 18 per cent. on $157,500	$7,090

(As boiler plant charges are included in charge of 0.6 cent. per kw. hr. for electric power, only 25 per cent. of total charge is allowed for steam driven auxiliaries.)

Total yearly operating cost	$223,984
Saving with all electric drive per year	$28,524
This equals 35 per cent. interest on investment of	$81,900

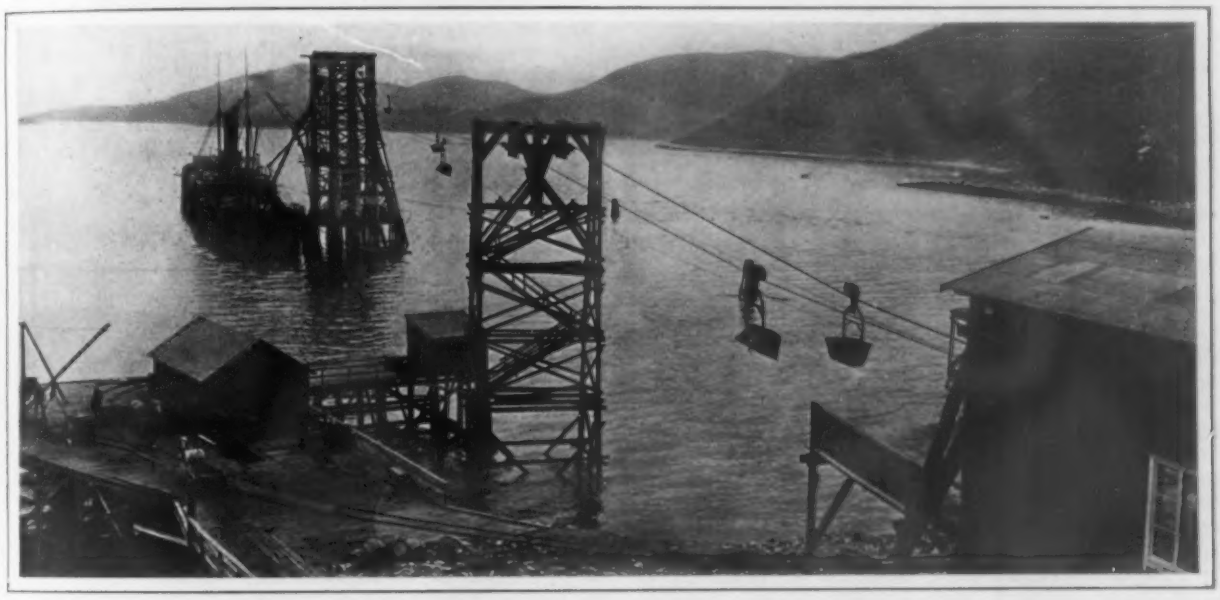
The figures given in the estimates are on a very generous basis, as there are a great many items which have to be given consideration in compiling figures on first cost and operating cost. Endeavor has been made, however, to check the various items according to latest practice and market prices and as much field data as possible has been obtained in order to establish the cost of operation. The comparison shows that the saving in cost of operation of the all electric plant will pay a very substantial interest on the extra investment required, and in addition there are numerous incidental advantages which make the electric drive a very attractive proposition. On the basis of purchasing power at ¾ cent per kw. hr., the cost of operation of the all electric plant is somewhat lower than with the steam engine plant, and the cost of installation is approximately 40 per cent less.

Iron Ore Loading Plant in Norway

Wire Ropeway Installation Near Narvik of the Westfjord Iron Ore Company

The Westfjord Iron Ore Company, an English company with headquarters in London, possesses iron ore fields in Norway in the neighborhood of Bogen in Ofoten, on the banks of a bay in the Westfjord, not far from the small town of Narvik. The ore in the deposits already opened out is at present won in open workings, and then brought by an inclined plane to the terminal of a Bleichert wire ropeway, which runs over the crest of a hill to the dressing plant some 3900 feet away. On this ropeway there are two spans of about 1300 and 1950 ft. width respectively.

The ore dressing plant is located near the shore, the ore being subjected to a wet magnetic process and the concentrates stocked in a magazine capable of holding about 8000 tons, where danger of freezing is avoided by the employment of a heating plant. From here the ropeway, shown in the illustration, runs to a loading station in the sea built far enough out to allow steamers of 6000 tons, with a draft of about 28 ft. to moor alongside. The distance from the magazine is about 755 ft., and the depth of the water up to this point about 23 ft., though this then suddenly increases to 30 to 33 ft. The station itself is erected on a slight eminence of the sea bed, some 19 to 23 ft. below the surface of the water, with deep water at the remote side.



Loading Iron Ore Near Narvik, Norway, by Means of a Wire Ropeway

The hight of the station has been calculated so that, even at high tide (the difference between ebb and flood amounts to about 13 ft. at this point), the telescopic loading chute, which is attached to a small slewing crane, will pass into the hold of an empty ship at an angle of 60 deg., because the moist concentrates would not otherwise slide easily.

The method adopted when installing the plant was to first drive piles into the bed of the sea. These were allowed to protrude about 3½ ft. above water level, and the station structure erected on the foundations formed in this way. With the object of preventing the station getting damaged by large ships which are difficult to navigate in the narrow channel, strong piles are also provided for the ships to moor against, so that they do not come into contact with the actual station structure.

In the loading operation the material is first withdrawn from the magazine on longitudinal belts for transference to a transverse belt; the latter delivers to a hopper from which the ropeway cars are fed. The cars travel automatically over the whole track and round the return sheave in the station, where they also tip their contents automatically into the hopper, from which the material slides down the chute into the ship's hold. A hundred cars with contents of 1¼ tons each are conveyed hourly over the loading line, giving an hourly capacity of 125 tons, so that the process of loading a ship is distinctly expeditious. The other ropeway running from the mine to the dressing plant is calculated for a capacity of 50 tons per hour. The Bleichert system, it may be added, is licensed in America by the American Steel & Wire Company.

A Double-Compartment Core Oven Installation

The Oven Equipment & Mfg. Company, New Haven, Conn., has recently installed a new bank of core ovens in a Cleveland, Ohio, foundry, which is designed for operation in connection with trucks, holding from 3 to 4 tons of cores each. The equipment measures 28 ft. across the front, is 12 ft. deep and stands 6½ ft. above the tracks. The oven is divided by a solid wall into two compartments, each of which has two double doors that open the full width to admit a truck of cores.

An inclosed flame gas burner, located at the center and operated from the rear of the oven, heats each compartment, and air under pressure of approximately 1 lb. is forced through the burner by a positive pressure blower. This superheated air circulates throughout the interior of the oven, and is calculated to force the steam and the fumes out through the vents which are provided. At the same time the escape of heat is prevented by covering all six faces of the oven with insulating material. It is emphasized that the positive circulation and the high temperature maintained in the oven enable results to be secured in one half the time that is required when coal or coke is used, and at the same time the amount of gas consumed is small.

In the design of the oven three safeguards have been provided. The burning of gas in a steel pipe with no open flame anywhere is relied upon to eliminate the fire risk. An automatic cut-out valve which cuts off the gas pressure whenever the air falls below a predetermined point prevents the gas from accumulating in the oven and causing an explosion as the result of a sudden failure of the air pressure. To prevent pressure from being applied to the interior of the oven without providing for any escape of the gases, the doors are adjusted so that they cannot close unless the vent dampers are open.

The Export-Verband Deutscher Qualitäts-Fabrikanten, Remscheid, Germany, an association which includes a large number of manufacturers who "specially aim at supplying good sound wares," states in a recent catalogue that many buyers are unaware of the great strides made by German industries in the last few decades. In illustration of this point it is asserted that, according to recent reports, the number of operatives engaged in the manufacturing industries of Germany is 11,256,000, whereas in Great Britain the number is 8,364,000, in the United States 7,039,000, and in France 6,993,000.

Contracts Not to Re-engage in Business

Validity of Restraint on Competition —Decisions Affecting Manufacturers —Remedies for Breach of Agreement

BY A. L. H. STREET

Originally the courts held that a contract whereby one bound himself not to re-engage in a given business was void, as tending to create a monopoly, and, therefore, to be violative of public policy. But this rule has been so far relaxed that it is now a general principle of law that such an agreement, made by the seller of an established business as part of the consideration for the purchase, will be enforced, if it is no broader than is reasonably necessary for the protection of the purchaser in the enjoyment of the good will which he has bought.

Restriction as to Territory Must Be Reasonable

To be enforceable, however, the contract must not preclude the seller from re-engaging in business anywhere; the restriction as to territory must be reasonable. Whether a given contract is reasonable in this respect will be tested by the relation of the extent of territory over which the business was done when it was sold to the area from which the sellers are by their agreement excluded; if they are not excluded from any more territory than is required to enable their successors to successfully prosecute the business, the contract is enforceable (43 Atlantic Reporter 723).

An agreement by the seller of a manufacturing establishment not to re-engage in the same business in States over which the business sold did not extend has been declared by the New Jersey and Illinois courts to be invalid (case last cited and 56 Northeastern Reporter 393). For stronger reasons, a contract not to re-engage in certain business anywhere in the United States is usually held to be void (Missouri Supreme Court, 69 Southwestern Reporter 355). And on sale of a manufacturing concern, the seller's agreement not to resume business anywhere was declared to be void though limited to a period of 25 years (61 Northeastern Reporter 1038). But, according to a decision of the United States Circuit Court of Appeals, a contract not to enter into business in competition with the purchaser, for a term of years, may lawfully extend to all territory wherein the purchaser's trade is likely to go, the nature of the business being considered (135 Federal Reporter 1008, 1015).

In New York it has been lately held that a contract binding the seller of a business not to re-engage in a similar business will not be enforced, unless the restrictions are limited as to time and territory, and it is necessary to uphold the contract, in order to give the purchaser of the business the benefit of his purchase (139 New York Supplement 220). On the contrary, the rule in Massachusetts, as announced by the Supreme Judicial Court of that State, is that a contract not to resume a certain business is valid, though not limited as to time or space, if it is coupled with the sale of a business and is necessary to protect the purchaser in the enjoyment of his bargain (89 Northeastern Reporter 548; 79 Northeastern Reporter 790).

The Colorado Supreme Court holds that one may lawfully bind himself to refrain from pursuing a particular business within certain territory, even though it be an entire State, if the restraint thereby established is reasonable and affords only fair protection to the one for whose benefit it is imposed (131 Pacific Reporter 430). But, in Georgia, an agreement not to re-engage in the manufacture of certain articles for five years, without limitation as to territory, was recently declared to be void (73 Southeastern Reporter 729).

Distinction Between Local and Nation-Wide Business

Thus it would seem, from the general trend of court decisions, that on sale of an enterprise doing business in a small district of a large city an agreement by the seller not to resume the same business anywhere in the city would be unenforceable, whereas, on sale of a manufacturing concern which has done business throughout a large group of States, the seller might preclude themselves from re-engaging in business in any of those States. The distinction to be drawn between enterprises which are dependent on local trade only and large manufacturing concerns operating throughout the country is touched upon by the Massachusetts Supreme Judicial Court in the following language: "The good will of selling engines to reduce pulp to paper is manifestly one not dependent on the place where it is carried on. A paper manufacturer is not concerned where he buys his machinery. What he wants is the best made machine at the cheapest price."

In some States the courts hold that the restriction as to the time during which the competition is to be barred must be limited to such period as will enable the purchaser of the business sold to become acquainted with his new trade, and thus stand on at least equal footing with his predecessor in seeking to hold former customers. But that a contract which is unlimited or indefinite, as to the time during which the seller's competition with his successor is to be barred, is not invalid if reasonably limited as to territory has been decided by the highest courts of Georgia, Illinois, Michigan, North Carolina, Rhode Island and Texas (26 Southeastern Reporter 71; 68 Northeastern Reporter 781; 72 Northwestern Reporter 157; 25 Southeastern Reporter 813; 37 Atlantic Reporter 344; 84 Southwestern Reporter 250). The New Jersey Court of Chancery has upheld a contract not to engage in the manufacture of door knobs limited to a period of approximately five years, though unlimited as to territory (74 Atlantic Reporter 680). And, in Maine, the validity of a bond not to engage in the business of iron casting within 60 miles of the city of Calais, in that State, has been sustained (40 Maine Supreme Judicial Court Reports 224).

Contracts Restraining the Production of Special Articles

A contract which restrains an inventor, without limitation as to time or place, from exercising his skill in making certain articles is invalid (37 New Jersey Equity Reports 171). An agreement by an inventor of a brake-beam, in selling his patent, not to engage in the manufacture of brake-beams during the life of the patent, and not to become connected with any company manufacturing or selling such devices, as officer, employee or stockholder, was valid (141 Federal Reporter 923). An agreement by officers of distinct manufacturing corporations, whose business was purchased by a newly organized company, not to engage in a like business in competition with the new company, for a period of five years, unless they should withdraw as officers of that company because put to a disadvantage as to salary, has been upheld by the Massachusetts Supreme Judicial Court (50 Northeastern Reporter 509).

The Michigan Supreme Court has adjudged void an agreement whereby a manufacturer, in consideration of $1500, agreed to suspend manufacture of certain articles for one year, with privilege in the other party to renew the contract for an additional period of four years (81 Northwestern Reporter 328). And a contract by one manufacturer with another, in consideration of a percentage on sales made by the latter, not to produce strap and T hinges for five years, the agreement to be void on the latter increasing his facilities for the production of such hinges, has been declared void by a Federal court (52 Federal Reporter 562).

An agreement by one manufacturer with another, without a sale of his business, not to make certain articles, is unenforceable as being in unreasonable restraint of trade (84 Federal Reporter 544). But the intention of the purchaser of a factory to manufacture only one of the several kinds of articles which the plant has produced does not render invalid an agreement by the seller not to produce any one of the different classes (New Jersey Court of Errors and Appeals, 43 Atlantic Reporter 723).

On breach of a valid agreement not to resume a given business in competition with the purchaser, he is entitled to recover damages which have been directly sustained by him in consequence of the breach, and may procure an injunction against further violation of the contract.

The principles here stated are applicable to sales of one partner's interest to another.

It is generally held by the courts to be a rule of law that mere sale of the good will of a business does not preclude the seller from establishing a competing business, but that he may not personally solicit his former customers; that an express agreement not to re-engage in business is essential. There is a decision to the contrary, however, in a case decided by the Massachusetts Supreme Judicial Court (89 Northeastern Reporter 548), wherein it was held that implication on the sale of the good will of a business, of a covenant not to re-engage in a similar business in competition with the buyer, arises on the ground that it is necessary to protect the purchaser in the enjoyment of his purchase.

Safety in Iron and Steel Mills

Recent Observations of L. H. Burnett, Carnegie Steel Company

Some interesting observations on the safety movement were made at the recent Safety Congress in New York, held simultaneously with the meeting of the Association of Iron and Steel Electrical Engineers, by L. H. Burnett, assistant to the president, Carnegie Steel Company. Among other things he said:

"The chief function of the safety expert today, so far as mechanical safeguards are concerned, is to get the best device for the purpose intended, adopt it as a standard for his plants, and see that it is properly installed. For example, we may take the question of proper protection of electric switches. There seems to be an almost hopeless difference of opinion on the subject. There are hundreds of different switch covers, none of which seems to be entirely satisfactory under all conditions. There are those who maintain that protection is not necessary when the voltage does not exceed 250, although we read of fatalities caused by contact with only 110 volts. It would seem that this important problem might best be solved by the Association of Iron and Steel Electrical Engineers, as a recommendation from them would undoubtedly be followed by the majority of safety engineers.

"Proper lighting plays a most important part in safety work and here again we find wonderful progress being made. The substitution of tungsten lights in place of the arc light has added greatly to the lighting facilities of our plants. One great advantage of the tungsten light is that it may be placed upon cranes and moving machinery, where light is most needed.

Neatness about the Plant

"A most important element in all safety work and one that is ignored by many of our safety inspectors, is the absolute necessity of a general appearance of neatness and good order about the yards and buildings. The workman, who adheres to the rule 'A place for everything and everything in its place' is, of necessity, a careful workman and one who will perform dangerous work in a safe and careful manner. Neat and clean surroundings have an undoubted influence for care on the part of the individual. If, on the other hand, he is required to work amid scenes of disorder, if the mill floor and yards are littered with refuse and loose material, he will become careless and slovenly in his habits and be much more liable to personal injury. We have found that the installation of grass plots and flower beds at suitable points throughout the works have the effect of stimulating the men to greater efforts in keeping the entire plant clean and neat. In many instances the men themselves have taken care of the flowers and grass during their spell periods.

"There can be no clear-cut division between safety and welfare. One is a direct aid or supplement to the other. The furnishing of pure drinking water by means of sanitary fountains, doing away with the common drinking cup; the construction of sanitary water closets, shower baths, lockers, in short everything which contributes to the physical well being of the workman, is a direct safety measure and just as important as the guarding of dangerous machinery.

"The Carnegie Steel Company is now installing at its several plants about 100 bulletin boards, uniform in design and construction, to be devoted solely to the display of articles and photographs pertaining to accidents and safety. The past winter it gave 21 safety entertainments to more than 15,000 of its employees. The entertainments consisted of music, moving pictures, lantern slides and very little talking. They were found to be effective in stimulating a general interest in safety."

Prevention through Bonuses to Foremen

Mr. Burnett expressed it as his opinion that the most promising method of preventing accidents is the system of bonuses to foremen and others in direct charge of operations, which has been adopted as an experiment by the National Tube Company. The amount which a foreman will receive depends upon his ability to improve the accident record of his department. The plan should be successful, as the foreman is the one most important factor in safety work. He can do more than any other individual in seeing that his men are properly instructed as to hazards; are given a safe place in which to work and that they do their work without taking unnecessary chances.

The greatest improvement must come in the reduction of 71 per cent. due to negligence of the workmen. This can only be accomplished by pushing the present campaign of education, with every means at our command, until we have the enthusiastic co-operation and support of every man in the industry.

For several years the Illinois Steel Company made a careful classification of all accidents with the following average results: "Accidents due to trade risks, 23 per cent.; to negligence of the company, 6 per cent., and to negligence of workmen, 71 per cent." It may readily be seen from these figures that the real problem confronting the safety man today is to devise some method or scheme to induce the men to keep ever before them the necessity for exercising constant care in their daily work.

Another Combustion Engine for Low-Grade Oil

The American Gas Engine Company, Kansas City, Mo., has developed a vertical internal combustion engine, designed for use in connection with low-grade fuel oil. The engine, which operates on the four-cycle, single-acting principle, is built along the same general lines as the company's line of multi-cylinder gas engines.

The governor, which is of the simple ball type, connects with a double disk balanced valve in the mixer, to cause the gas and air mixture to be delivered in a correct volume to the cylinders, as required by the load. The cylinder head is cast hollow with liberal water circulation space, the cooling water being taken from the head in the space around the valves by goose necks which does away with openings in the top of the cylinder. There is a set of holes at the bottom of the water jacket for the removal of sediment and scale.

The engine is started by an automatic air starting device. Pulling over the air valve handle drops the valve stem on a cam. The cam automatically admits air under pressure to one of the cylinders, thus starting and keeping the engine in motion until the gas entering the other cylinders is compressed and fired. The inlet and exhaust valves are operated from a cam shaft and the valves are adjustable to 0.001 in. by a steel disk between the valve rod and the cam mechanism. The piston end of the connecting rod has a special anti-friction bronze box, which is adjustable by a screw and wedge, so that it is possible to adjust the bearing by a socket wrench without dismantling the engine. The piston has two oil rings and four compresion rings, the latter being in sections, with a split keeper ring. The compression rings are designed to expand and fit the cylinder walls tightly as the pressure rises.

A new ore roasting plant will be constructed by the Lake Superior Corporation, Sault Ste. Marie, Ont., Canada, to cost $50,000. Experiments will be tried on the siderite ore from the Magpie and Helen mines.

Foundrymen Discuss Local Transportation

Newark Association Hears Speakers on Relative Merits of Electric, Gasoline and Horse-Drawn Trucks

The Newark Foundrymen's Association, Newark, N. J., at its meeting October 8, which was the first after the summer recess, was addressed on the subject of the relative merits and costs of gasoline, electric and horse-drawn trucks by R. T. Hodgkins, manager New York office Studebaker Brothers Company of New York; C. K. Thomas, manager Federal Truck Company, New York, and Joseph H. Wood, manager Newark Express & Transportation Company.

Address by R. T. Hodgkins

Mr. Hodgkins, dwelling briefly on the subject of horse-drawn trucks, said that the ordinary merchandise truck, with reasonable care, will last from 20 to 30 years. He said his company had this year offered a prize to the one who had in use the oldest Studebaker wagon and the prize was won by a man who had a farm wagon which had been in constant use for 49 years. Everyone in the manufacturing business, said Mr. Hodgkins, has had his own experience with horse-drawn trucks and all differ. To get down as closely as possible to facts, he quoted data which he had obtained from a New York company operating 30 trucks. He had taken the maximum figures and from these he estimated the first cost of horses, harness and truck of five-ton capacity to be about $1500. To depreciation of these items he charged $208, allowing one-sixth for horses, one-third for harness and one-twentieth for wagon, which, with interest on the investment, charges for shoeing, storage, rent of stalls, veterinary services, feed, incidentals, administration and driver, brought the yearly operating cost to $1710. Such a truck could cover about 15 miles per day, or 4500 miles per year of 300 days, at a cost of 38c. per mile, or $5.70 per day, approximately 7½c. per ton mile. The subject of electric trucks was then taken up by the speaker, who said in part:

NEED OF INVESTIGATION BEFORE BUYING.

"It is generally agreed that for anyone to advise a prospective purchaser to buy an electric truck in preference to horse-drawn vehicles or in preference to gasoline trucks, without first making a careful study of the conditions under which the truck is to operate, would be absurd, for the reason that the conditions of the roads, the distance of the hauls, the nearness to service stations and the speed to be obtained are all details that require serious consideration.

"It is a difficult problem to estimate what will be the cost of operation of a modern motor truck under any given set of conditions and particularly so of an electric truck. If you base your estimates upon records extending over four or five years or more, you are likely to estimate a number of items too high, since in the motor truck business as well as every other business, with the exception of the wagon business, changes in construction in the last five years would undoubtedly reduce the cost of repairs, tires, batteries, etc., to a figure considerably below the cost of these items for the earlier types of cars. The fact that electric trucks have not been generally in use for a period of ten years makes it rather difficult to get accurate data. In the case of gasoline trucks the Massachusetts Institute of Technology was not able to get information on a truck which had seen seven years of service although a very careful canvass was made in the attempt to accumulate data on this subject.

EFFECT OF ROAD CONDITIONS AND COST OF TIRES.

"Road conditions will be found to affect materially the cost of operation. Grades and road conditions all affect the power consumption, the wear of the tires, also the total mileage that can be obtained.

"The cost of tires figures largely in the cost of operation. After a careful study of the cost per mile for tire renewals of eight trucks used under different conditions, it was found that the cost varied anywhere from thirteen-hundredths of a cent per mile up to a fraction over five cents per mile for a truck of the same capacity. You will see from this that the service conditions of the road, the load under which the truck is operated, all affect materially the amount of money which you would spend to keep your truck in operation.

REPAIRS AND BATTERY RENEWALS.

"An electric truck, as a rule, needs general overhauling and painting at least once a year. It is almost impossible to obtain a true figure of the average cost of repairs through the life of a truck, for the reason that records of cars that have been in service for a number of years cannot be taken as representative of what may be expected of modern cars. Again, records of cars which have been in service only a year or two cannot be accepted as the probable average throughout the life of the car. Battery renewals depend not only upon the mileage, but also upon the time in service, upon the number of cycles of charge and discharge and other items affecting the average energy consumption per mile, such as the number of stops, the condition of the roads, the load, the speed and the care taken of the car. Battery elements can be replaced without replacing the whole battery.

"The rates for electric current vary according to locality. In New York we pay a fraction over 5c. per kilowatt-hour per car. The number of watt-hours per car per mile for a given size of car varies considerably in consequence of the character of roads and grades, number of stops per mile, kind of tires used, average speed and the care which the batteries receive. Some people are lavish with the use of oil in machines. Chauffeurs' wages range from $2.25 to $3.25 a day for electric trucks.

DEPRECIATION, INSURANCE AND FIRST COST

"Manufacturers generally claim a life of ten years. Conservative users figure on a life of three to six years. The oldest electric truck now in service of which any cost records have been kept, and on which the writer has been able to get any data, is seven years old. We had two electric trucks of our own manufacture which had been in service about four years. We had these overhauled at an expense of a few hundred dollars and sold them to a man who operates a transfer business in the uptown section of New York. So far as we know, these trucks are giving satisfaction and good service. By replacing parts from time to time, these trucks can probably be kept in use for a number of years. A 20 per cent. depreciation would be a conservative estimate. Interest of investment should be included in figuring the cost of car operation. If many trucks are in operation an administration figure should be taken into consideration. The practice of the various companies in regard to carrying insurance differs widely. The rate for fire insurance depends upon the amount of protection carried, and the age and value of the car, although a flat rate frequently exists for all models of electrics.

"The cost of electric trucks ranges about as follows: 1000 lb. trucks, $1,750 to $1,800; 2000 lb. trucks, $1,900; 1½ to 2 ton trucks, $2,000; 3-ton trucks, $3,600, and 5-ton trucks, $3,750. The mileage obtained without recharging is from 55 to 60 miles for light trucks and 50 miles for 5-ton trucks. The apparatus for recharging consists of a charging board, necessary volt meters, ammeters, switches, plugs, etc., and costs in the neighborhood of $1,200. In the event of only alternating current being available, a transformer will be necessary, adding several hundred dollars more. Most service stations, however, are provided with a charging board, so that this expense could, in most instances, be obviated."

SOME EXAMPLES OF OPERATION

Mr. Hodgkins submitted figures coverings a 2-ton electric truck which was operated a daily average of 30 miles, 9066 miles in all, at a cost of 29c. per mile, or $8.70

per day. With this truck the cost of tires was $178; cost of repairs, $227; current, $466.30, and battery renewals, $211, totaling, with other items, $2686.30 for operation and maintenance. He also gave statistics of the operation of a 5-ton electric truck, which cost $3196 for the year, and the per mile cost of which ran to the extremely high figure of 39c., because of the fact that the truck had been run but 17 miles per day. Had the same truck been operated 45 miles a day, which was well within its powers, the cost per mile would have been brought down to 32c. The cost of tires with this last truck was $429; cost of repairs, $251; current, $261, and battery renewals, $440. This last example Mr. Hodgkins laid great stress upon as it set forth the crux of the motor truck question—the necessity of keeping it at work. Expeditious loading and unloading are of the greatest importance, so much so that for the latter operation cranes to be carried on the truck are being designed.

CONCLUSIONS AS TO FIELD OF OPERATION

Mr. Hodgkins summed up as follows regarding the field of operation:

"For the firm whose sole use for a truck is hauling to or from a depot within a radius of two or three miles, where long waits are necessary and where the truck must be moved up in line, it is doubtful if there is anything better than a horse-drawn vehicle. For such work the electric would have a preference over the gasoline truck, as the electric can be started and stopped without the trouble incident to the starting and stopping of gasoline truck; but even then, if the electric truck experiences long waits the expense becomes heavy.

"Where deliveries are within a radius of five miles and where no delay is experienced in loading and unloading, so that the truck can be operated not less than 35 to 40 miles per day, the electric truck would have a preference over the horse-drawn vehicle. If the deliveries are at some distance, say 7 to 10 miles, with loads 3 to 10 tons and no long waits, and the roads are good, the purchase of either a gasoline or an electric truck would be advisable.

"These conclusions are borne out by the experience of concerns in New York, below Fourteenth street, who have purchased gasoline and electric trucks and attempted to use them for deliveries to freight terminals and for custom house service. The long waits practically made the use of these trucks prohibitive."

Address by C. K. Thomas

Mr. Thomas, after traversing some of the same ground covered by Mr. Hodgkins, said, in part:

"Long hauls are where the gasoline trucks show to the very best advantage. The longer the haul the more economically is the truck operated. The great grief of the truck business is the matter of drivers. The owner of the motor truck should take into consideration that, instead of having from $500 to $1500 invested in a team of horses and a wagon, he has from $2000 to $6000 invested in a truck and should engage a truck operator appreciating the investment he has in his care. A little more wages saves many times the amount in repair parts. Every operator of a truck should take care of his motor, and it should be his duty at the end of a run to clean the motor, tighten nuts and bolts, make the necessary adjustments, and, in other words, completely groom his truck so that it is ready for business the next day. The cost of these operators is according to local conditions. Wages should run from $18 per week up.

TRAILERS SUGGESTED FOR HAULING CASTINGS

"In connection with the haulage of castings the question arises what do you consider a load? If the load runs from three tons up, your proposition is either a trailer using the truck as a tractor, if your traffic laws will permit, or a semi-trailer, a body with two rear wheels only and the front of this body carried on the rear end of the chassis. A motor-tractor to carry a maximum load of 6000 lb. can trail 10,000 lb. to 15,000 lb. on the semi-trailer. If your loading facilities are slow, you can operate two or more semi-trailers to one chassis. This is another case of working out your own individual problem. I am not in favor of loads of over 3 tons on a chassis, as the average wheelbase is from 12 in. to 14 in. This means that if on this base you are carrying a load say of 5 tons, and the weight of the truck is 5 tons, you have a total of 10 tons, or 20,000 lb. There are very few roads in the United States that will for any length of time carry this load without doing a great amount of damage to the road and to the truck.

ITEMS OF EXPENSE AND MILEAGE

"A motor truck properly constructed and adapted to your business should be good for 100,000 miles, with ordinary care. I know of a number of trucks that are still in operation and have to their credit 130,000 miles. The average concern will figure 20 per cent. on depreciation, which makes the life of a truck 5 years, but with proper care 16⅔ per cent. is sufficient. This makes the life of a truck 8 years, doing 16,000 miles per year. This is a little more than 50 miles a day for 300 working days. The insurance should first include fire, accident and collision, but to be on the safe side the owner should include liability and property damage.

"Repairs depend almost entirely upon the carefulness of the driver. Upon close record of the cost of operation of 1 and 1½ ton trucks and 3 and 4 ton trucks, some of the 4-ton trucks having semi-trailers carrying 5 tons and 6 tons, we find that repairs on the 1 and 1½ ton trucks will average from 1½c. to 2c. per mile, on the 3, 4 and 5 ton from 2c. to 4c. per mile. This includes the taking down of the motor and overhauling twice a year.

"The operating cost of 1 and 1½ ton motor trucks doing 50 miles a day should not exceed 13½c. per mile. This does not include the fixed charges of depreciation, interest and insurance. On a 3 and 4 ton motor truck doing 40 miles a day, the operating expenses should not be more than 19½c. per mile, not including the fixed charges of depreciation, interest and insurance. These figures are taken from the actual working of a truck where the charges have been tabbed very close. On October 3 the record for a standard motor truck operated by the Thatcher Furnace Company showed that 17,000 lb. of freight was carried on a 3-ton truck doing a mileage of 50 miles for the day, making three trips. Ten gal. of gasoline was put in the tank in the morning, several gal. remaining unused after the day's work, and one quart of lubricating oil. This truck will average about 7 miles on a gallon of gasoline.

SERVICE VERSUS OVERLOADING

"The question of service is the bugaboo of the truck business. It seems that no two people can agree as to what constitutes service. The manufacturers of motor trucks have agreed upon a guarantee against defective workmanship and material; that is, to replace any defective parts within the time of the guarantee. Truck manufacturers and dealers, in order to keep peace between themselves and customers, have replaced parts that were not defective. The majority of people owning a truck will overload it. All good trucks are built to carry a certain percentage of overload, but they are not built to carry the overload and stand excessive road shocks. The purchaser of a truck should satisfy himself that the truck he is negotiating to buy is adapted to his business; that it is backed by the integrity of the manufacturer as well as the dealer; that the dealer is able to take care of him in the matter of repair parts; that the cost of these repair parts is not excessive and that the truck has been thoroughly demonstrated and is beyond the experimental point. In fact, a manufacturer or dealer selling a truck should be willing to make an agreement to operate the truck and maintain it, supplying the driver, gasoline, lubrication, repair, overhaul, up-keep tires, garage and clean the truck at a fixed rate per day or per week."

Experience of Mr. Wood's Company

Mr. Wood pointed out that horses and harness could be bought in quantity much below Mr. Hodgkins's figures. His company had tried motor trucks between Newark and New York, but had abandoned their use and gone back to horses, because of their unsatisfactory service in the congested portions of downtown New York. He agreed with the previous speakers, however, as to much of what they had stated.

The Southwestern Iron & Metal Company, Dallas, Texas, has been incorporated with a capital stock of $6000. Philip Lipsitz is president, H. Rosen is vice-president, and Eli Karchmer is treasurer and general manager. The metal obtained by this company will be used in the plant of the Philip Lipsitz Company, Dallas, of which Philip Lipsitz is the sole owner, manufacturing car and engine brasses, solder, babbitt metal, etc.

The Why and How of Making a Time Study

A Syllabus of the Steps to Be Taken in Introducing Scientific Management

What may be termed as a guide to one who is considering the advisability of introducing scientific management in his plant is a paper presented to the American Foundrymen's Association before its Chicago meeting this week by C. E. Knoeppel, New York City. It is entitled "How to make a Time Study" and essays to give to the investigator the various specific as well as general points which must be considered, and besides enumerating the essentials in a clear and systematic fashion, gives a number of concrete illustrations. The frequent use of tabulations and classifications is calculated to make it relatively easy for the management to study its own conditions. Owing to the general character of the paper and the space it would take if printed in full in these columns, it has been thought best to give in the following some of the main points brought out by the author, leaving it for those who care to pursue the subject further to apply to the secretary of the American Foundrymen's Association, Dr. Richard Moldenke, Watchung, N. J., for a copy of the paper, which may undoubtedly be had on application. It should be added that the author has attempted to indicate that much which he has outlined is applicable to the jobbing foundry as well as to the foundry engaged in turning out products in multiple.

Elements in Establishing Scientific Management

Early in the paper the author emphasizes that time study is necessary because: 1—a man can accomplish considerably more than he does; 2—the management as business is at present conducted does not know what constitutes the best a man can do.

The training of the men in any one shop is largely the result, he points out, of doing the work as best they can plus observing what the others do, and the occasional word of advice and instruction from the busy and perhaps overworked foreman. Our workers are not the product of a practical plan of intelligent direction and guidance. An analysis of the records showing the details as to those who are hired, who quit and who are discharged, will reveal a condition in many plants which cannot mean efficiency and which shows conclusively that we are failing not only to supply incentives but neglecting opportunities in man development. At any rate, the average man, as we find him, does not have the time, nor the training, nor the inclination to take the initiative in eliminating faulty conditions and doing everything possible in arranging for the proper adjustment of men and conditions. If he did possess these essentials, he would be a foreman—not a workman.

Following a further discussion of the workman, and also of the executive management and the shop management, arguing how the last two of the three factors are, as plants are usually run, in no position to take up in detail the present day idea of industrial management, he enumerates the following elements, to which proper time and attention should be given:

1. The determination and elimination of faulty and unnecessary motion made by the men.
2. The duplication by all men of the most efficient motions of the best men.
3. The scientific determination of the best that a man can do day in and day out without injury to his health.
4. The proper division of responsibility so that the men will not be asked to shoulder any beyond turning out a product of good quality, without delays and annoyances, in the shortest time possible.
5. The analysis and betterment of all faulty conditions.
6. Rewarding the men in proportion to the skill and effort of each man.

Determining a Fair Standard for Wage Payment

On the subject of determining a fair standard, a subject of importance in wage payment, for example, the author has the following to say:

How is a fair standard determined, for it is obvious that the best time should not be used? No absolute law can be developed that will fit every case. The facts in the case plus careful study and good judgment are the governing considerations. It is possible, however, to arrive at an approximation in many cases, which will serve as a valuable indication of what standard to decide upon. In my practice I have used this rule:

A fair standard is approximately one-half the difference between the best time recorded and the average time of the readings, added to the best time or deducted from the average time.

Any standard determined should be one that a man can attain day in and day out without injury to his health of body and mind. Recently an operation was scheduled at 23 pieces per hour and the worker was for a reasonable period unable to make the schedule. He usually produced 16 pieces per hour of 5 hr. in the morning, or 69.5 per cent. efficiency. Right after the noon hour I specified a 25-min. working period with 5 min. rest, with the result that in the first hour 18 pieces were produced while in the second 20 pieces were produced. The time was then changed to 17 min. work and 3 min. rest, three such periods to the hour and the production rose to 22 pieces per hour. In the fourth hour, or the ninth hour after starting time in the morning, the division made was 10 min. work and 2 min. rest, and this resulted in 23 pieces per hour. The nature of the work was fatiguing, yet we were able to get 100 per cent. efficiency at the end of the day by allowing 16⅔ per cent. rest. Subsequently the average efficiency of the man in question was between 95 and 100 per cent.

As giving some idea of the applicabilty of management study to the foundry, the following paragraphs may be taken from the author's paper:

In any one shop some men are best at ramming, others most efficient at setting gaggers, still others best at finishing, setting cores, etc. Find the man who is best at any one thing. Study this thing and ascertain just how he does his work. Reduce it to standard practice and then induce the other men to follow as closely as possible the standard way determined upon. All men following in all lines of work the best practice of the best men will mean more to the foundry industry than you have any idea of.

In slicking it will no doubt be found that some molders will use a small tool when a large one would mean much faster work. In nailing, I have many times seen molders placing nails much closer together than the requirements demanded. Cases have also been noticed where too much facing was used.

If you will stop to consider the elements which influence the making of molds, you will find that they are as follows: A. The area of the mold. B. The depth of the mold. C. The class molding. D. The kind of molding. E. The pattern. F. The core work. In order, therefore, to make time study data valuable in every foundry regardless of the class of work, the first step is to classify the various elements.

Organizing the Work

In conclusion, the author gave some hints for those contemplating the introduction of time study work, and these observations largely in full are as follows:

Unless you intend to make the right kind of a study of the men; unless your aim is their betterment as regards both health and earnings; unless you have the right kind of men to make the studies—men who are tactful, diplomatic and who will wear well with the workers—it would be best to refrain from starting the campaign. If, however, you are with those wise executives who see in their men more than mere bone and muscle; who see a side awaiting development, secure the right kind of time study men and start the work. The results will surprise both you and the men.

It should be remembered, however, that the time studies will not in themselves correct all evils. There are other important requirements. The analysis of time study data will reveal faulty and wasteful conditions, imperfect and inefficient planning, unstandardized operations, and unless proper steps are taken to properly handle these elements, the time study campaign will fail to accomplish all that is possible. This, however, is not the fault of the time studies made but of the management for not properly co-ordinating the various steps. You can readily appreciate how futile it would be after studying a job and finding that 8 hr. was sufficient time to do what had taken 15 hr. previously, to simply standardize the time and nothing else. This would be virtually putting it up to the men—the very thing we are trying to get away from.

Conditions should be made the best possible; the most efficient planning and dispatching arranged for; operations standardized as regards methods of working and time

allowed. Time study data properly collected, compiled and analyzed will pave the way most efficiently for this work, and the only thing now remaining is to furnish the men with the incentive which will warrant them in taking full advantage of these improved conditions. I will not take the time to discuss wage payment methods, but I do want to impress upon you the fact that there is a law of wage payment which if lived up to will mean a surprising willingness on the part of the men to fully co-operate. This law is:

Men at work will do their best and accomplish the most when engaged in work which stimulates; when rest balances exertion; when they can work efficiently rather than strenuously; when force and driving tactics give way to the leadership which attracts; when causes contributing to worry have been eliminated; when the attitude of mental impossibility no longer keeps them from attempting greater things; when responsibility is properly divided and the inefficiencies separated as between the management and the men; when provision is made to cover the natural inertia due to habit; when they have faith in the intention of the management to deal fairly and honestly; when they are guaranteed against cuts in rates; when they do not deem it necessary to hold back and become deceitful in their attempt to influence rates; when they are given an amount to cover the time employed plus an additional amount which represents to the men the skill and co-operation displayed.

A Large Water Purifying Plant

The Youngstown Sheet & Tube Company, Youngstown, Ohio, has closed a contract with the Wm. B. Scaife & Sons Company, Pittsburgh, for the necessary apparatus to supply 4,000,000 gal. of softened and purified water for boiler feed purposes every 24 hours. The present installation, consisting of 6 wooden reaction tanks and 7 wooden filter tanks, 8 ft. in diameter, is to be dismantled on the completion of the new plant.

The new equipment will include 8 steel filters 15 ft. in diameter, of the gravity type, each with a capacity of 500,000 gal. per 24 hours, and 8 steel reaction tanks, 30 ft. in diameter and 26 ft. high, the capacity of the apparatus being based on the operation of the reaction tanks in pairs. Provision has been made in the filter house for the installation of two additional filters in the near future, as well as two reaction tanks to be added to the tank equipment, bringing the capacity of the filter plant up to 5,000,000 gal. per 24 hours. Space has also been reserved on the site of the new filter plant for the additional equipment necessary to furnish the plant with 7,000,000 gal. per 24 hours.

The raw water from one of the condensers at the blast-furnace power house is pumped into the reaction tanks by a Wilson-Snyder motor-driven single stage centrifugal pump, and the treated water from the reaction tanks is carried to the filters by gravity. The purified water is then pumped from the clear well beneath the filters to the feed-water heaters in the respective boiler houses by a Wilson-Snyder single stage, centrifugal pump, driven with a Kerr steam turbine, a second pump of this same type having been installed as a spare for the purified water pump as well as the raw water pump.

South African Preference to Local Manufacturers.—The South African Union Government Gazette announces revised regulations of the government practice in the awarding of contracts. These read in part: "Heads of departments when recommending tenders to the board, and the board when considering tenders, shall, in comparing tenders, allow a preference of 5 per cent. on supplies produced within the Union of South Africa or manufactured within the Union from articles grown within the Union, and a preference of 2½ per cent. on supplies manufactured within the Union from imported ingredients or partly so."

An alum mountain near the Gila River, in southwestern Mexico, which is 900 ft. high, covering 2 square miles, is pronounced by the United States Geological Survey to contain material so pure that for many uses it can be marketed in the natural state. As a probable source of aluminum this material may have a still greater value, since there are enormous beds of lignite near by.

Powdered Coal for Open-Hearth Furnaces

Recent Successful Installations at Sharon, Pa. —Economies in First Cost and Operation

Considerable interest is being manifested lately in the application of powdered coal to the heating of open-hearth furnaces. Installations of apparatus adapted to this end have recently been made at the plants of the Sharon Steel Hoop Company and the National Malleable Castings Company at Sharon, Pa., as well as at one of the Carnegie Steel Company's Sharon plants. A. W. Raymond, of the Raymond Brothers' Impact Pulverizer Company, Chicago, who supervised the installation at the first two plants, furnishes the Coal and Coke Operator with some description of them:

"Several difficulties were experienced in these installations. The first trouble was in the adhesion of the ash to the checkerwork and a resultant slagging or choking. The coal used at this time was pulverized in a centrifugal ball mill, depending on screens for controlling the degree of pulverization. It is impossible to obtain on this type of pulverizer a product containing more than 90 per cent. of 100-mesh goods. And the cost to obtain even such a coarsely ground coal on the above types of pulverizer is relatively very high. Obviously the method of solving this problem was to obtain a finer degree of pulverization.

"The other troubles experienced were inability to control the heat or to maintain the necessary temperatures. All the difficulty seemed to lie in the inability to obtain a finely pulverized product and to maintain the degree of pulverization without variation from one end of a run to the other. Investigation of cement mill practice pointed to the conclusion that the correct method of pulverization was one in which the degree of pulverization was controlled, not by a flimsy screen, but by such indestructible means as air currents and centrifugal force; so the Raymond system was installed.

"This system has a guarantee of finished product so fine that 95 per cent. will pass through a 200-mesh test screen. The cost per ton of preparation at the above fineness is about 25c., while 15c. will pulverize a ton so fine that 95 per cent. will pass through a 100-mesh screen.

"With the installation of the above equipment and a few minor refinements in the method of burning and design of furnace, all difficulties have practically disappeared. Furnaces have run as many as 100 consecutive heats without cooling at the rate of three heats a day. Sulphur content in the steel is as easy to control as when producer gas or fuel oil is used. Temperatures can be maintained with a variation of 25 deg. F. The time required to melt a 20-ton heat has been reduced about one-half hour, and the consumption of coal per ton of steel is somewhat less than with producer gas. The quality of the steel is in no way injured.

"The cost of a pulverized coal plant and distributing system is about half that of a similar capacity producer gas equipment, giving an initial saving of 50 per cent. The cost of pulverizing and distributing the coal is about three-fourths of the cost of making and distributing producer gas. The only coal specification is less than 2 per cent. sulphur content, under 10 per cent. ash, which means that a cheaper coal can be used than in a gas producer."

Convention of National Founders' Association

The Administrative Council of the National Founders' Association has decided to hold this year's convention at the Hotel Astor, New York, Wednesday and Thursday, November 19 and 20. In the past year the Iron Molders' Union has carried on an aggressive recruiting campaign with a view to establishing the closed shop with its well-known restrictions. In consequence, the National Founders' Association has had more to do with labor troubles than in any preceding year since 1906.

Reviews of the strikes in various foundry centers will be a prominent feature of the program at next month's convention. The results of workmen's compensation legislation in various States will be discussed, also labor legislation in general, and ways and means of keeping the public properly informed concerning various phases of the labor problem. The convention banquet will be held Wednesday evening, November 19.

The Status of the Electric Steel Furnace*

Arc Type Preferable from an Operating Standpoint—Electrode Consumption and Cost—Various Furnaces and Their Future Development

BY WILFRED SYKES†

The practical uses of the electric furnace in the steel industry are these: (1) Refining steel from open-hearth furnaces or Bessemer converters, (2) making steel from pig iron, (3) making steel from scrap, (4) making steel for castings, and (5) melting alloys for use with open-hearth and Bessemer plants.

The function of the electric furnace in refining is to maintain the metal at any desired temperature without the necessity of having present oxidizing or reducing gases. The electric furnace does not depend, for its action, upon any characteristic of the current, its sole function being to maintain the metal at any desired temperature.

When the metal is maintained in a molten state, without the presence of any gases that might affect its composition, the ordinary metallurgical processes can be carried much further than is possible in an ordinary open-hearth furnace, so that the injurious constituents, such as sulphur and phosphorus, can be reduced to negligible values. The ease with which the temperature can be regulated makes possible the production of steels that can only be rivalled by the best results of the crucible.

Keeping in mind that the function of the electric furnace is simply to maintain the metal at the proper temperature to enable the metallurgical processes to take place, it is obvious that it is much more economical to partially refine the metal in an open-hearth or Bessemer plant than to attempt to make steel from pig iron direct, as the elimination of the bulk of the impurities can be as readily accomplished in the open-hearth furnace or Bessemer converter as in the electric furnace. The final elimination of the sulphur and phosphorus is the real field of the electric furnace, in conjunction with one of the present methods of handling the bulk of the impurities. For handling large quantities of material, it would appear that the ideal arrangement would consist of a Bessemer or open-hearth plant to do the main refining, the electric furnace being used simply for the elimination of the occluded gases and the reduction of the phosphorus and sulphur to a negligible value. With such an arrangement, the power consumption is very low, and the additional cost of the steel can be more than compensated for by the increased market value of the product.

The Two Types Compared

Both the arc and the induction type of furnaces have been used for this work. The arc furnace, from the standpoint of power supply, has some advantages over the induction type. It can be used on ordinary commercial frequencies and operates with a power factor from 70 to 90 per cent., depending upon the size, arrangement of leads, etc. Its first cost is considerably cheaper than the induction type.

The induction type of furnace has a very low power factor on the usual frequency of 25 cycles for sizes over one or two tons, and it has been found necessary to use frequency changers to supply the furnace with frequencies down to 5 cycles per second for larger sizes. The first cost of the induction furnace, together with the frequency changer, is, of course, considerably higher than that of the arc type.

The arc type requires carbon electrodes, and, on account of the construction of the furnaces, the life of the furnace arch is comparatively short, due to the intense radiation from the arc. The furnace cover is usually made removable and it can be replaced in a short time. The life of the remainder of the lining is comparable with that of the open-hearth furnace. The difficulty of making large electrodes, 18 in. to 24 in. in diameter, such as are required for furnaces of 10 to 15 tons capacity, leads to excessive consumption, due to the poor quality. The mistake has been made of increasing the current density in some of these furnaces, so as to use smaller electrodes, but such an expedient leads to greater electrode consumption. The electrode consumption is a very important item in the cost of steel production. In some of the earlier experiments made in this country, the cost of electrodes varied between $2 and $3 per ton of steel produced. This figure has been reduced, due to the experience gained, but, even at present the electrode consumption of a 15-ton furnace is approximately $1 per ton of steel produced, and it is not anticipated that this cost can be reduced below 75c. per ton of steel.

The absence of electrodes in the induction type of furnace is a very important advantage, and the absence of the intense radiation of the arc enables the lining of the furnace to be used for a much longer period than is possible with the arc type. Records have been obtained from induction furnaces showing a lining life up to 500 charges, which is many times in excess of what can be obtained with the arc type. The induction type of furnace also has a thermal efficiency of approximately 10 per cent. more than the arc type. This is, however, probably offset by the loss in the converting machinery required to give the low periodicity for this type of furnace.

Both types of furnaces are in practical use for the final refining of steel, and from the standpoint of the quality of material obtained, neither type seems to present any particular advantage over the other. It might be mentioned that the construction of the arc type of furnace is preferable from an operating standpoint, as the slag is readily formed over the whole at the surface of the metal, and it can be more easily removed than is possible with the induction type, which has a comparatively small surface area in the form of rings around the transformer coils.

Making Steel from Scrap

The electric furnace is used to some extent for making quality steel from cold scrap, and the arc type has been largely used for this purpose, due to the fact that no special arrangements are necessary to enable it to start with cold material. The field for this quality of steel can be seen from the following statistics of crucible steel production in this country:

	1911, tons	1912, tons
Crucible steel ingots	83,623	100,967
Crucible steel castings	14,050	20,550

All this steel could be produced in electric furnaces if necessary.

The induction furnace must be started with a cast or welded ring in the metal trough, as satisfactory results have not been obtained by simply piling the scrap together. After the induction furnace is started, when using cold materials, only two-thirds of the charge can be poured, as one-third must be kept always in the furnace for starting the next heat.

The electrode consumption of the arc type, when operating under such conditions, is very high, due to the time each charge is in the furnace, the electrode consumption being a function of the time the furnace is in use. The quality of material produced by the electric furnace using cold scrap is at least equal, if not superior to, that produced in crucibles, and in Europe such furnaces are being used to a considerable extent for the production of fine grades of steel.

At the present time it is hard to say which type of furnace is considered the better for this work, as both types are used to about the same extent, but the convenience of the arc type in starting is an important consideration. The time per charge for the melting and refining is about 6 hr. It might be mentioned that the largest crucible steel manufacturer in America has recently installed an

*A paper read before the seventh annual convention of the Association of Iron and Steel Electrical Engineers, New York, September 22 to 27.

†Westinghouse Electric & Mfg. Company.

electric furnace for the production of crucible quality steel. The field is a fairly large one, as the production of crucible steel in 1912 was 121,000 tons, all of which could have been furnished by electric furnaces if necessary.

Making Steel for Castings

One of the most promising fields for the electric furnace is the making of steel for high grade castings. A great deal of work has been done along these lines in Europe, and one or two concerns are using electric current for steel castings in this country. There is no doubt as to the field for small castings, providing a quality can be produced that has the qualities of good open-hearth steel. In 1912, 20,000 tons of crucible steel castings were made, and the electric furnace would have been able to produce the required quality of steel at much lower cost.

In an article in *The Iron Age* of May 29, 1913, E. F. Cone describes some results obtained from an electric furnace operated by the Treadwell Engineering Company, Easton, Pa. The high quality of the product obtained is evidenced by the tests published, and any one familiar with the requirements of the manufacturing companies will appreciate the great advantage obtained from a constructive standpoint when castings of such quality are available.

Up to the present time, the electric furnace has been used only for the production of comparatively small castings, but with the development of this trade, there is no reason why large castings, requiring high quality, should not be produced. The quality of castings produced is equal to those made by the crucible process, and naturally, the cost of production is considerably less. It is to be anticipated that, in the future, electric furnaces will be installed in our largest steel plants, for the melting of the alloys used in the production of steel. The induction furnace is probably the most desirable for this work, and this furnace load may be a factor that will be of interest to the engineer in charge of electric installation.

Furnaces of the Arc Type

The earliest practical furnace was the Héroult, and, up to the present time, this type is still in the lead, as far as the number of installations is concerned, and capacity. With this type the arcs are in series, and it gives the best electrical characteristics of any of the arc type. The voltage varies from 80 to 100, and the power factor from 70 to 90 per cent. on 25 cycles, depending upon the capacity of the furnace and arrangement of the leads.

All furnaces of the arc type are open to the objection that the input fluctuates considerably, especially if started with cold material. When starting a furnace cold there are frequent short circuits, the current being only limited to the reactance of the furnace. In some respects, therefore, it is an advantage to have the furnace so arranged that the power factor is comparatively low, as this reduces the shocks on the power plant.

With a large furnace, of say 15 tons capacity, the input will vary from 0 to 100 per cent. overload almost instantaneously. When the furnace is only used for molten metal, the fluctuations are not so great, but, even under these conditions, the power will vary from 50 per cent. of full load to 50 per cent. overload instantaneously.

The only other representative of importance of the arc type is the Girod furnace. This furnace has a single electrode, the current being conducted through the bath to the bottom of the furnace, which is connected to the other side of the line. Due to the fact that this furnace has only a single arc, the current required is greater, and, consequently, as a rule, the power factor is considerably lower than that of the Héroult type. To get the same power into the furnace approximately twice the current is required, and consequently the difficulties experienced with the electrodes are very much increased. It has been the practice of Girod to use a higher current density than is adopted in the Héroult type, and consequently the electrode consumption is considerably greater, the best figures averaging at least twice those obtained with the Héroult furnace.

Furnaces of the Induction Type

Of the induction furnace, the principal representative is the Roechling-Rodenhauser. This type is really a combination of induction and resistance furnace, and has been designed to work on a commercial frequency. On 25 cycles the power factor of this furnace is comparatively low, not exceeding 50 per cent. with a furnace of eight tons capacity. For a large furnace it has been proposed to use lower frequencies, down to about 10 cycles per second, in order to obtain reasonable operating characteristics. This necessitates a frequency changer, which, on account of the special characteristics, is necessarily expensive. At 10 to 15 cycles per second, its operation, however, would not be prohibitive.

The next important representative of this type is the Frick furnace, which has been used to some extent in Europe, and has been strongly advocated by its builders. From an operating standpoint, it presents a number of advantages, not the least being that the surface of the metal is horizontal, which is not the case with other induction furnaces, and consequently the amount of slag required to cover the surface of the steel is less. An undesirable feature is the very low power factor, which requires an extremely low frequency to make the furnace at all operative. For instance, a 20-ton furnace operating on 5 cycles has a power factor of only 50 per cent. and cannot be operated at all on 25 cycles. This is a very great drawback to this type, as special generating or converting equipment is required, the expense of which very greatly increases the cost of the equipment. It appears that an ideal induction furnace is yet to be produced. The necessity of having some special generating or converting apparatus for large induction furnaces greatly restricts their usefulness, and for this reason the arc furnaces are used wherever possible in preference to the induction type. In the smaller sizes, the induction furnace can be used on 25 cycles, and they seem to present advantages over the arc type.

Future of Electric Furnaces

During the last five years, the production of steel by electric furnaces in the United States and Germany, which countries are the principal producers, has been as follows:

Year	United States	Germany
1908	55 tons	19,500 tons
1909	13,762 tons	17,700 tons
1910	52,141 tons	26,200 tons
1911	29,105 tons	60,600 tons
1912	18,309 tons	74,200 tons

From this table it can be seen that the production has greatly decreased in the United States during the last two years. This is, to some extent, due to the business conditions existing in the steel industry in this country, and also to the desire to find out what results could be obtained from the rails that were made from electric steel in 1910.

Several years ago a quantity of rails were made in Germany from electric steel, but they have not yet been in use long enough to determine whether they are sufficiently superior to the ordinary rails to warrant the additional expense. For this reason the progress in Germany has been slower than has been anticipated, the production of electric furnaces being mainly confined to high grade alloy and crucible steels. There seems to be little doubt that in time electric furnaces will supersede crucible in the production of high-grade steel. It will also be used to a considerable extent in the production of high grade castings, especially small castings, such as are used for automobiles, etc. It is apparently an open question whether the electric furnace will be used at all for the production of rails and structural material. If it is not, then the field will be necessarily restricted to a comparatively small production. If it finds general use in the production of rails and structural material, then the electric furnace will become the most important piece of apparatus in the steel mill, and the characteristics outlined in the foregoing will present the problems of the first magnitude.

Blast Furnaces Not Exempt.—The industrial board of the New York State Department of Labor has denied the application of the Northern Iron Company, Port Henry, and the Tonawanda Iron & Steel Company, North Tonawanda, for exemption of blast furnaces from the provisions of the recently enacted labor law. Under the law every employer of labor engaged in carrying on any factory or mercantile establishment in the State is required to allow every employee at least 24 consecutive hours of rest once a week.

The Steel Corporation Dissolution Suit

Officers of Independent Steel Companies Tell the Extent of Their Ore Holdings, Especially in Cuba and South America

The Bethlehem Steel Company's Ore Supply

At the hearing on Wednesday, October 8, in the Government suit against the United States Steel Corporation the submission of testimony for the defendant was continued. Charles Austin Buck, a vice-president of the Bethlehem Steel Company, was the first witness. He stated that his company uses in its blast furnaces at South Bethlehem, Pa., between 1,250,000 and 1,500,000 tons of iron ore a year. Part of this supply comes from Cuba. From the Kiirunavana mine in northern Sweden the company gets 400,000 tons a year. The rest is obtained from the Lake Superior district and from the Adirondacks.

As to the Bethlehem Company's future supply, Mr. Buck said it would come from the Tofo mine in Chile, near Coquimbo, about four miles from the coast. This mine has been acquired by his company within the last six months. It has 60,000,000 tons in sight, with no prospecting work. "This rich ore is sticking out of the ground on a conical hill unconcealed by earth," he said. "We believe there are 150,000,000 tons on the property. We intend to bring it through the Panama Canal to Philadelphia and will operate our own boat line for this purpose."

He added that preparations were being made to ship 1,500,000 tons of ore a year through the canal. The cost of mining the ore and getting it to the coast would be very cheap, and as the ore was at the surface it could be quarried. He added: "I do not know of any other ore the equal in quality of this. There are a number of such deposits in Chile, some that can still be purchased, and the United States Steel Corporation does not own any of it. We estimate that we can deliver this exceptionally high grade ore very much cheaper to South Bethlehem from those foreign ore beds than we can any of the Lake Superior ore."

In addition to the ore beds in Chile, Mr. Buck said that the Bethlehem Company owned about 200,000,000 tons on the north coast of Cuba, and from 4,000,000 to 5,000,000 tons on the south side of the island.

Henry S. Snyder, another vice-president of the Bethlehem Company, testified that the United States Steel Corporation owns about 200,000,000 tons of ore in Cuba, while independent companies hold about 3,000,000,000 tons. He said that his company had planned to begin shipments through the Panama Canal from Chile in 1915, either to Philadelphia or New York, and that the Chilean supplies ought to last, at present rate of consumption, for 60 years.

A Texas Hardware Merchant Gives Testimony

Edward S. Hughs, who conducts a hardware business at Abilene, Texas, was put on the stand to show there is keen competition in the sale of steel products in that State. In answer to the direct questions of the Steel Corporation's attorneys he said there was competition in his territory, naming many companies represented there.

"Have you observed any dominancy of any manufacturer in Texas?" he was asked. He replied that the American Steel & Wire Company has achieved a dominancy in the Texas district partly because of the large line it carries, and partly because of the warehouse it established there in 1907, since it is thus able to give prompt delivery on orders.

In the cross-examination, Judge Dickinson tried to disqualify the witness by showing that he did not give all his time to the hardware business, and did not come in contact with the actual conditions of the market. The cross-examination brought out that Mr. Hughs is general manager of a railroad, president of a national bank and president of a steamship company with offices in New York, in addition to being in the hardware business.

Two Geologists Give Data About Ore Deposits

Frank L. Nason, consulting geologist, testified as to the large ore deposits of New York and New Jersey. He said that in the Adirondack region are 800,000,000 tons of natural ore or 350,000,000 tons of concentrated ore; in southeastern New York, about 35,000,000 tons of concentrated ore and in New Jersey 70,000,000 tons of concentrated ore.

Edwin E. Ellis, of Birmingham, Ala., a geologist formerly with the United States Geological Survey and now with the Tennessee Coal, Iron & Railroad Company, testified regarding the iron mines which are being operated near Belle Island in the Conception Bay district, Newfoundland, of which he had prepared maps. He said that claims have been taken as far as 12 miles out from shore and that it is planned to operate workings of that length. The mines are underneath Conception Bay. He estimated the reserve at 3,250,000,000 tons, allowing for workings five miles long.

The Minnesota Tax Commission Brought In

At Thursday's hearing Rukard Hurd, secretary of the Minnesota Tax Commission, gave figures from the State records to show by the taxes paid what part of the ore deposits of Minnesota is held by the Steel Corporation. He said: "If we include the Great Northern tonnage in the amount allotted to the Steel Corporation, it controls 78.55 per cent. of the ore in Minnesota on which taxes are paid. Without including the Great Northern tonnage, the amount controlled by the Steel Corporation would be 61.85 per cent." It will be recalled that the Steel Corporation has announced that the lease of the Great Northern ore lands will be terminated January 1, 1915.

President Rand Tells About Cuban Ore

On Friday the first to testify was Charles F. Rand, president Spanish-American Iron Company and Buena Vista Iron Company, owned by the Pennsylvania Steel Company. He exhibited a table showing his estimates of the iron ore deposits of Cuba, according to which the total amount of commercially available ore there amounts to 3,221,000,000 tons. Of this the Spanish-American Iron Company controls 1,403,500,000 tons and the Steel Corporation, through the Pilota Iron Company, a subsidiary, about 210,000,000 tons.

In cross examination, Mr. Rand refused to state the cost of mining and shipping Cuban ore, but he said that the cost of nodulized ores from the north coast of Cuba, delivered at Baltimore, is less than 5c. a unit. The analysis of dry Mayari ore for the first four months of 1913, he said, was 55.57 per cent. iron; 4.41 silica; 14.21 alumina; 2.13 chromium; 1.04 nickel and cobalt; 0.022 phosphorus.

Edwin C. Eckel Again on the Stand

Edwin C. Eckel, who was sworn Thursday, was recalled. He told about the work which he did in the Birmingham district in Alabama, while he was in the employ of the United States Geological Survey. He also told about the deposits in New York State. The results of this work are set forth fully in bulletins issued by the United States and New York geological surveys.

Mr. Eckel told about a visit which he made in 1906 to the iron-bearing districts of Texas. At that time the Geological Survey was making preparations to check up the work of the Texas Survey. Because of the pressure of work in other districts, the Federal Survey has not yet had an opportunity of making a thorough examination of the Texas deposits, but from his preliminary work there, said Mr. Eckel, he is able to state that the work of the State experts was approximately correct. The ore in Texas is of the brown variety, he said, and contains about 48 per cent. iron. It lies in 20 counties in northeastern Texas. The overburden in no place is thicker than 2 or 3 ft., hence stripping would not be difficult. It would not be necessary to wash the ores before using, he said. Approximately 250,000,000 tons are immediately tributary to railroads now operating. This represents about one-third of the total iron ore tonnage in Texas. Mr. Eckel has investigated the cost

or delivering Texas ore to Philadelphia, and said it can be laid down there at a cost of 4½c. to 5c. per unit.

President **Wood of Maryland Steel Company Testifies**

Frederick W. Wood, president Maryland Steel Company, testified that the blast furnaces of his company at Sparrows Point, Md., were originally built for operating on foreign ore. The company is now using ore from both the north and south coasts of Cuba. In the future, after the south coast deposits have become exhausted, the Maryland Company will operate on north coast ore exclusively. This ore, he said, because of the elements it contains, is admirable for steel-making, and "we believe that from this ore we produce the best rails which are made."

For use in shipbuilding, Mr. Wood said, the Maryland Steel Company buys the steel for about two-thirds of its plate requirements from the Pennsylvania Steel Company. The remainder it buys in the open market. In 1912 it purchased plates from the Lukens Iron & Steel Company and Worth Bros. Company, and some were delivered by the Steel Corporation, but the witness could not remember whether these were contracted for in that or in the previous year.

"Is there much competition between the plate makers to secure your business?" asked Mr. Reed, of counsel for the defense. "Yes," said Mr. Wood.

"Do their prices vary?"

"Yes, we buy where we can get the lowest price."

On Tuesday Edwin C. Eckel again testified. After telling of large ore deposits in the Adirondacks, which had been worked for 150 years he said that in Newfoundland there are 3,500,000,000 tons of economically available ore within a radius of 5 miles of Bell Island. Besides this there are billions of tons which are not economically available at this time. In one deposit alone in the Newfoundland district he said that the ore runs 30 ft. thick and contains about 90,000,000 tons to the square mile.

Mr. Eckel estimated that ore could be brought from the Newfoundland mines to Philadelphia at a cost of about 4c. per unit. Foreign ore sells at Philadelphia at 7 to 7½c. per unit. Lake Superior ore cannot be laid down at Baltimore and Philadelphia for less than 9c. per unit, he said, or from 2 to 2½c. per unit more than the foreign product.

Coke Scarcity in France

Scarcity of coke to meet the needs of French pig-iron producers is becoming a question of considerable importance. The output of pig iron and the building of new furnaces are on the increase, according to the London Iron and Coal Trades Review. Since 1905, when the output of pig iron amounted to 3,076,000 tons, the production has increased until the total has reached 4,949,000 tons in 1912, the East or Meurthe and Moselle district alone having been responsible for 3,455,000 tons of this total. On the other hand the production of coke in the North only advanced from 1,772,000 tons in 1905 to 2,443,000 tons in 1912, supplies being of necessity imported from Belgium and Germany. It is found to be far from convenient to depend upon other countries for about 3,000,000 tons of coke per year.

The only battery of coke ovens in the Meurthe and Moselle district is at the works of de Wendel & Co. The Pont-a-Mousson Blast Furnaces and Foundries have just decided to install 80 coke ovens which will probably be supplied from mines in France, England, Belgium, Holland and Germany. Though the cost of production will be necessarily high because of this, it will be compensated for by the economies resulting from the surplus gas, estimated at from 1s. 7d. to 2s. 4½d. per ton of coal carbonized, and by the value of by-products. The example of this company is likely to be followed by others.

Improvements which will eventually involve an outlay of $300,000 are under way at the Lyon Mountain, N. Y., mines of the Chateaugay Ore & Iron Company. These include the sinking of a new shaft and the installing of electric haulage and hoisting equipment. The mines will be operated more extensively than heretofore. Practically the entire output is shipped to the Standish, N. Y., furnace, of the Delaware & Hudson Railroad Company, which is operated under lease by Pilling & Crane.

The Steel Corporation's Charters for South America

Mention has already been made of the chartering of several vessels by the United States Steel Corporation to carry its products to South American ports. President J. A. Farrell went into detail as to the conditions leading to these charters, in giving testimony on October 10 in the Government suit against the Brazil Steamship Conference Lines. Mr. Farrell said that the Steel Corporation now owns five ships engaged in the export trade and is building others; also that some of these will enter the Brazilian trade and will carry the American flag. The corporation, he said, had recently decided to use the United States & Brazil Steamship Company as the name under which its ships would be operated in the Brazilian trade. Of the vessels recently chartered for South American trade, one was loaded August 29 with steel rails and made its deliveries at Rio Janeiro in 23 days. The second sailed October 9, having in part general cargo. Four of the boats have been chartered from the American-Hawaiian Steamship Company. In going to South America these vessels would take on pig iron and steel products at Savannah and Gulf ports. The practice of the conference lines had been to take on such freight at New Orleans, where their boats discharged coffee. Afterward the boats would come up to New York for general cargo and thence sail direct for Brazil.

The corporation, Mr. Farrell explained, has etablished a South American line to maintain its position in securing large railroad contracts in competition with European countries. He considered that the rates of the conference lines had not been sufficiently low to permit of proper development of the Steel Corporation's business in South America. The corporation's shipments of steel products to Brazil had varied from 75,000 to 150,000 tons a year. For the San Luis Railway 36,000 tons had been shipped, and a large contract is now being filled for the Paulista Railway. Mr. Farrell said that the production of the Steel Corporation's Alabama plants would become more and more diversified and that eventually $15,000,000 more would be spent on the plants in that district. Details were given of advances made in freight rates for wire and other products since the Steel Corporation's trade with South America had increased to important proportions. In September agents of the Hamburg-American Line in Brazil offered reductions of 5 shillings to 10 shillings a ton, but these were made after the announcement of the starting of the new Brazilian line of the Steel Corporation. The conference lines could not satisfactorily take care of the Steel Corporation's South American business, as they ha fixed sailings and could not alter these without putting other shippers to inconvenience. It was stated that the Steel Corporation in its foreign operations used 3000 sailings last year.

In contrast with conditions abroad where the ship conferences, merchants' associations and shippers cooperate, it was explained that there is no cooperative effort in this country. Abroad merchants have much to say about rates, and if dissatisfied are able to put on their own ships so that rates are kept within reasonable bounds.

Correction.—In the description of the new addition to the Hamilton Foundry & Machine Company's plant in *The Iron Age* of October 9, it was erroneously stated that the trolley system was installed by the Coburn & Crowley Company. This work was done by the Coburn Trolley Track Mfg. Company, Holyoke, Mass.

The expected car shortage is fast approaching. The net surplus of freight cars on October 1, according to the bulletin of the American Railway Association, was 10,374, as compared with 40,159 September 15, a decrease of 29,785. This change was brought about by a decrease in the gross surplus of cars from 61,753 to 41,994, and an increase in total shortages reported from 21,594 cars to 31,620. With so heavy a demand for cars evident in the last half of September, it is probable that at the present time there is no net surplus and that the next report, that for October 15, will show a considerable net shortage. October is the month in which large shortages of cars usually develop.

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The Closed Shop and the New Tariff

Both the president and the secretary of the American Foundrymen's Association, in their reports presented at the great Chicago convention this week, pressed home upon the members the necessity of fresh economies to meet the conditions imposed by a low tariff. A way must be found, it was urged, to increase output and reduce the cost of production. The suggestion is always in order; in fact, it has more recently had the sanction of high authority at Washington as applicable generally to manufacturing operations. One of the virtues of lower duties, we have been told, will be found to be the spur they give to the lagging, inefficient manufacturer.

It will no doubt occur to some foundrymen that a movement carried on by union molders in the past year with every energy they could bring to bear, in bitterly fought strikes, has been calculated to tie foundry employers hand and foot in any endeavor to adjust themselves to the new era of lower prices. Aided by their successes of the past two years in winning to their legislative proposals the same Congressmen who have lately legislated to make it harder for American manufacturers to get a profit, the unions are now vigorously pressing their campaign for the closed shop. Foundrymen know that the success of that campaign means the summary ending of any plans for increasing efficiency in their shops. The union is uncompromisingly against any wage system or any shop method that will take out of its hands the control of output and the final word as to what shall constitute a day's work.

A Congressional committee which investigated scientific management as applied to Government foundries and machine shops pronounced against it. Congress, also at the behest of the labor unions, passed a law imposing the eight-hour day upon manufacturers doing contract work for the Government and thus encouraged the movement for an eight-hour day in all industries. Such handicaps upon home manufacturers were serious enough under a protection regime. But what has the labor union lobby to propose now? Will it undertake to decree like increases in the costs of European shops?

In passing the Underwood tariff the present Congress called loudly upon American manufacturers to reduce the cost of their product. At the same time it has given constant aid and encouragement to the labor organizations that are now saying to the same manufacturers, Reduce it if you can. It is no marvel that such employers as are in the hands of the closed shop unions are just now taking a little time to think.

The Measure of Readjustment in Steel Prices

Since it is axiomatic that the greater contains the less, it would seem to follow that if the readjustments in our steel prices to be forced by the tariff reduction are less than the readjustments that have occurred at various periods in the past when the steel mills had accomplished deliveries required by one buying movement, and were waiting for another such movement to assert itself, the steel trade prospects for the near future are to-day about as good as they would be had there been no reduction in the tariff.

Since the great boom of 1899 we have had four market readjustments, one centering in 1900, the next in 1904, the next in 1909 and the last in 1911. In all these cases the declines amounted to many dollars per

ton, but they were from levels much higher than that which marked the top of the last movement. Assuming for argument that the present readjustment would extend to the lowest level of any of those mentioned, which would be that of 1911, the decline would be less than any, and yet it would be much greater than would be dictated by the tariff alone.

The outstanding fact, however, is that the present readjustment does not promise to extend so far, by reason of the peculiar fact that while for months there has been pessimism among buyers, and prices have been distinctly falling in some products and weakening in others, the actual consumptive requirements have kept up nearly to the full productive capacity of the mills. As regards prices and the attitude of buyers toward buying for the future, we have now been for months in a period of readjustment. But the readjustment cannot be held to have caused much damage thus far, when the mills have been able to run at substantially full capacity, and are realizing upon their shipments practically as high prices as at any time in the past two years.

Computing Smoke Loss in Dollars

Under the auspices of the Mellon Institute of the University of Pittsburgh an investigation of Pittsburgh's smoke problem has been in progress for a year and a half. The latest publication on behalf of the investigation undertakes the somewhat difficult problem of computing the smoke loss in actual money. It is found that the direct loss is approximately $10,000,000 a year to the people of Pittsburgh; but this is represented as being only the direct loss, comprising the loss in fuel through imperfect combustion, about one-sixth of the total, and the cost of lighting and cleaning and keeping clean, as compared with similar costs in cities which do not have a smoke nuisance. Some indirect losses are mentioned in addition, including personal discomfort from living under disagreeable conditions, and the loss to the community through the fact that certain industries particularly requiring cleanliness will not locate in its midst.

The startling point in the finding, of course, is the ten million dollars. A scrutiny of the details of the loss shows that a considerable part of the total is made up of losses by retail stores, the data having been secured by questionnaires. There is reason to suspect a disposition on the part of storekeepers to overrate their losses, even if only through an unconscious bent toward helping along a good work, while it is quite improbable that these storekeepers were able to distinguish accurately between the damage done by smoke and that done by dust, since it is a fact that the heavy teaming in Pittsburgh is productive of dust to an unusual degree. However, it must be admitted that the major portion of the ten million dollars will stand close scrutiny, and that there are indirect losses, or at least inconveniences, which are not included in the money summary.

Pittsburgh's problem is not unique. There are other smoky and dirty cities, and it is well for each that there are others. The greater the problem the harder it will be attacked and the more likely a solution will be found and put into practice.

It is particularly encouraging to note the change in sentiment regarding the dirtiness of a city. Only a few years ago efforts to work improvement, as by restricting the production of smoke, were met with the plea that such efforts hampered industry. Prohibit smoke and dirt, and you drive industries away. The newer thought is that to clean up a city is to invite new industries rather than to drive old industries away, and this newer thought is more and more the prevailing one.

Manufacturers and the Panama-Pacific Fair

Machinery builders and other manufacturers of equipment are discussing among themselves the advisability of exhibiting their products at the Panama-Pacific Exposition at San Francisco in 1915. The question is raised whether it will be worth the expense, and opinions vary, as is always the case; but this is not so important with many owners as the consideration of freedom of action in regard to exhibits. Decisions, tentative and final, have been arrived at under what seems to be a misapprehension as to the actual conditions.

According to the prospectuses and the letters that have come to manufacturers in reply to direct inquiries, not only will space be free and the payment of freight charges one way insure a return of exhibits to the factory without expense, but, what is much more important in the light of current impressions, the exhibitor may employ at the exposition whatever help he may care to, regardless of the rules of the labor unions of California. The belief has been to the contrary, many employers thinking that men sent to set up or to operate machinery would be compelled to affiliate themselves with the local unions of their trade.

The exposition would do well to make a frank statement of these conditions. The feeling of many employers is strongly against yielding to the dictates of any body of workmen as to what shall be required of the men they employ at the expositions. If any have been misinformed as to conditions, the real status should be made clear to them at once, if they are to be represented among the exhibitors. The exposition project is close to the hearts of Californians, and undoubtedly labor leaders there would be loath to put it in jeopardy by adopting a policy of coercion.

Educating Illiterate Employees

Laws which on their face may threaten to hamper industry because of their restrictions on the employment of labor occasionally prove to have a most wholesome influence. In the beginning they may be annoying, but in the end work out results that are powerful in averting trouble for the owner and his men. Such is the case, according to intelligent observers, with a Massachusetts statute, recently gone into effect, which compels employers to see to it that a minor between the ages of 16 and 21 years shall attend some public evening school in the city or town in which he resides for the whole time during which such a school is in session, if the city or town maintains an evening school.

Some of the provisions of the law are as follows: An illiterate minor who wilfully violates any provision of the act shall be punished by a fine of not less than $5. Every person having under his control an illiterate minor shall cause him to attend a public evening school, and if such person fails for six sessions within a period of one month to cause the minor so to attend

school, unless the minor's physical or mental condition is such as to render his attendance at school harmful or impracticable, such person shall be punished by a fine of not more than $20. Whoever induces or attempts to induce such minor to absent himself unlawfully from school, or employs such a minor except as is provided by law, or harbors such a minor who, while school is in session, is absent unlawfully therefrom, shall be punished by a fine of not more than $50.

In the general law relating to the employment of minors the definition of illiteracy is "inability to read, write and spell in the English language as is required for the completion of the fourth grade of the public schools of the city or town in which the minor resides."

In some Massachusetts manufacturing plants the alien employees, male and female, between the ages of 16 and 21, constitute so considerable a percentage of the total that to accept the law philosophically is practically a necessity, else the labor supply would be seriously curtailed. This is markedly the case in the textile centers. In the metal industry dependence upon young men and women immigrants is constantly becoming greater, and most of these people cannot pass the educational requirements of the Massachusetts act.

Owners who have only a few of this class of employees have been tempted to get rid of them because of the new law. The broader viewpoint is gaining ground, however, from a beginning made by some of the larger works, the managers of which argue: "Let us assist in educating these young persons, for our own good as well as theirs. Give them the knowledge upon which they can base the intelligence with which to meet the arguments of agitators who prey upon ignorance of the English tongue and American conditions. Let them be able to read the newspapers, and enter into discussion with their better enlightened associates in the shops and factories. Let them become Americanized in the best possible place, the public school."

As a consequence, many young men and women are now attending night school, though the law did not go into effect until last spring. They must do so if they are to retain their positions. Their employers find it easy to co-operate with the schools, which report delinquencies to the employment bureaus or to whomever is held responsible. Also, those who have been refused employment or have lost their places because of the act must either attend school on their own initiative or go outside of the State to earn a living. Their education is compulsory. The adult alien will remain and others who have passed the age of 21 years will go to Massachusetts from abroad and from other States. But the younger generation will be educated to the point of a working knowledge of English. They will be independent of one of the most baleful types of demagogue—he who makes statements, false or distorted, which the ignorant alien accepts because his limited education does not enable him to analyze and refute them.

The clannish characteristics of some nationalities must be taken into account in the broad conception of the act. Certain peoples keep closely within themselves. They assimilate slowly. They need some degree of coercion. Every member of one of these colonies who has been educated in an American school constitutes an influence that may be tremendously important in counteracting, with his knowledge, the ill-founded advice of the advocate of labor trouble.

Correspondence

Heavier Loading of Cars

To the Editor: One of the most important problems for both the railroads and the shipping public to solve today is the question of greater car efficiency. In this connection the following is submitted to indicate to what extent the United States Steel Corporation's constituent companies have been instrumental in creating a car supply during the year 1912 by increasing the average carload from 34 to 36 tons.

A comparative statement of the average carload of outbound traffic for the years 1911 and 1912 for the American Bridge Company, American Sheet & Tin Plate Company, American Steel & Wire Company, Carnegie Steel Company, H. C. Frick Coke Company, Illinois Steel Company, National Tube Company, Pittsburgh Steamship Company, Tennessee Coal, Iron & Railroad Company, and Universal Portland Cement Company shows the following result: During the year 1911 the average carload was 34.6 tons, and for the year 1912 the average carload was 36.2, or an increase of 1.6 tons per carload. This increase of 3200 lb. to the average carload on outbound shipments means there were 76,105 fewer cars used to handle an equal tonnage as compared with the average carload of the year 1911, based on the outbound traffic of the above 10 companies.

Both the shippers and the railroads have been benefited to almost an immeasurable extent in the switching and weighing avoided, namely, the great saving in operating expenses, switching service on 76,105 cars or 152,210 terminal movements, and the expense of handling this additional number of both empties and loads through the various classification or interchange yards of the railroads from point of shipment to destination.

Figure this in any manner that may be tried, it will prove conclusively the money value of conserving the freight car equipment, not only when there is a severe car famine, but at all times. To illustrate: One company saved 122 cars by loading only 100 lb. heavier per car during the year 1912. The record of another company emphasizes the importance of heavier loading perhaps more than any other example, for even only 400 lb. per car increase on its traffic means that 15,836 fewer cars were required to move the same tonnage.

Consider what the shippers of the Pittsburgh district generally could accomplish in the way of creating a car supply by increasing the average load per car. Based on the total Pittsburgh district tonnage for the year 1912, an increase in the average carload on approximately the same basis as the record made by the United States Steel Corporation of two tons per car would have resulted in the same tonnage moving in 409,524 fewer cars. These figures not only indicate the large number of cars that would be available for shippers, but, based on an average haul of 100 miles, the increase of 1.6 tons per car would decrease the car mileage 40,952,400 car miles.

While the Pittsburgh district tonnage is merely used as a basis for computation, there can be no question that even a more remarkable showing could be made in increasing the average carload throughout the country generally, if the railroads would bring this subject before the shipping public. Shippers and consignees will be convinced that it is to their best interests to go to additional expense, if necessary, both in loading and unloading heavier cars, when they are made to realize that it means increased car supply, for there is nothing that interferes more with the general business of the country than a shortage of cars.

If this question is taken hold of now no doubt the movement would meet with the hearty co-operation of shippers, and the railroads can be persuaded to adopt cars of heavier capacity.

J. F. TOWNSEND,
Traffic Manager National Tube Company.

PITTSBURGH, PA., October 3, 1913.

September Copper Production and Stock

The regular monthly report of the Copper Producers' Association for September shows the stock of copper on hand October 1, 1913, to be 29,793,094 lb., a decrease of 8,520,943 lb. from that of the previous month. This is the smallest stock for any month since the producers' records were begun five years ago, the lowest previous stock being that for September 1, of 38,314,037 lb. The September statement of the association compares as follows with that of the previous month:

	September, pounds	August, pounds
Stock of marketable copper of all kinds on hand at all points in the United States at first of the month	38,314,037	53,594,945
Production of marketable copper in the United States from all domestic and foreign sources in the month	131,401,229	131,632,362
Deliveries of marketable copper in the month:		
For domestic consumption	66,836,897	73,649,801
For export	73,085,275	73,263,469
Total deliveries	139,922,172	146,913,270
Stock of marketable copper of all kinds on hand at all points in the United States at the close of the month	29,793,094	38,314,037

The production for September was 131,401,229 lb., which is about the same as that for August. Domestic deliveries for last month were 66,836,904 lb., a falling off of 6,812,904 lb. from those of August, but the foreign deliveries were only 178,194 lb. less than those for the previous month.

Coupling with the above showing the statistics of Henry B. Merton & Co., Ltd., London, the world's visible supply of copper October 1 was 41,119 gross tons, the stock in England and France and afloat thereto having then been 22,523 tons, and that of Holland and Germany 5296 tons. This is a reduction of 10,030 tons, as compared with September 1, and is by far the lowest supply on record.

Iron and Steel Institute at Chicago

About 175 acceptances have been received for the Chicago meeting of the American Iron and Steel Institute, Friday and Saturday, October 24 and 25, and an attendance of 250 to 300 is expected. There will be three sessions on Friday, most of the papers coming up at the morning and afternoon sessions, at 10 and 2 o'clock respectively. Two are reserved for the dinner at 7 p. m.—the paper of Theodore W. Robinson, vice-president of the Illinois Steel Company, on "Vocational Education," and the discussion by Stephen W. Tener, American Steel & Wire Company, Cleveland. The after-dinner programme also includes remarks by President Gary and by others on whom he will call.

A visit will be made to the Gary works of the Illinois Steel Company on Saturday, a special train leaving the La Salle street station of the Lake Shore Railroad at 10 a. m., and returning in time for the evening trains out of Chicago. The Blackstone Hotel will be headquarters for the meeting. The general committee of arrangements consists of James A. Farrell, chairman; E. A. S. Clarke, John C. Maben, Charles M. Schwab, John A. Topping and Frank S. Witherbee. The members of the Chicago committee are Eugene J. Buffington, chairman; M. Cochrane Armour, L. E. Block, Eugene B. Clark, Robert P. Lamont, Cyrus H. McCormick and Herbert F. Perkins.

Germany's Exports for Eight Months

The following table gives the statistics of Germany's exports of iron and steel products for August and for the eight months ended with August for the past two years, the quantities being in metric tons (2204 lb.):

	August		Jan.-Aug.	
	1913	1912	1913	1912
Total exports	488,434	466,140	4,298,165	3,890,499
Pig iron	59,031	79,429	572,566	675,144
Semi-finished steel	54,912	57,429	427,934	439,585
Beams	30,514	42,470	332,005	317,276
Other structural and bars	97,766	60,606	740,801	541,593
Plates (above No. 6 gauge)	35,566	22,382	299,324	191,028
Wire, rolled	11,521	17,314	123,912	126,457
Wire, drawn	6,399	5,737	59,773	48,844
Tubing	14,118	14,765	128,560	102,932
Steel rails	40,245	27,756	333,459	345,652
Railroad ties	9,106	3,194	67,569	80,193
Woven wire	568	1,602	8,547	10,156
Wire nails	4,442	4,315	42,665	34,712
Scrap	12,454	11,219	132,869	97,572

The totals given in the first line of the table include a number of items in addition to those enumerated, such as machinery, forgings, etc.

Larger Decrease in Steel Orders

The statement of the United States Steel Corporation shows that the total of unfilled orders on the books of its subsidiaries, September 30, was 5,003,785 tons, a decrease in the month of 219,683 tons, against a decrease of 175,888 tons reported the month previous. The table below gives the unfilled tonnage for each month back to December 31, 1910, and previous to that for the end of each year:

September 30, 1913	5,003,785	December 31, 1911	5,084,761
August 31, 1913	5,223,468	November 30, 1911	4,141,955
July 31, 1913	5,399,356	October 31, 1911	3,694,328
June 30, 1913	5,807,317	September 30, 1911	3,611,317
May 31, 1913	6,324,322	August 31, 1911	3,584,085
April 30, 1913	6,978,762	July 31, 1911	3,695,985
March 31, 1913	7,468,956	June 30, 1911	3,361,058
February 28, 1913	7,656,714	May 31, 1911	3,313,187
January 31, 1913	7,827,368	April 30, 1911	3,218,704
December 31, 1912	7,932,164	March 31, 1911	3,447,301
November 30, 1912	7,852,883	February 28, 1911	3,400,543
October 31, 1912	7,594,381	January 31, 1911	3,110,919
September 30, 1912	6,551,507	December 31, 1910	2,674,757
August 31, 1912	6,163,375	December 31, 1909	5,927,031
July 31, 1912	5,957,079	December 31, 1908	3,603,527
June 30, 1912	5,807,346	December 31, 1907	4,624,552
May 31, 1912	5,750,983	December 31, 1906	8,489,719
April 30, 1912	5,664,885	December 31, 1905	7,605,086
March 31, 1912	5,304,841	December 31, 1904	4,696,203
February 29, 1912	5,454,200	December 31, 1903	3,215,123
January 31, 1912	5,379,721	December 31, 1902	5,347,323

The present statement shows the smallest total since that of November 30, 1911.

New York Harbor Iron and Steel Plant

In the past week New York papers have referred to a project which has been under consideration by one interest and another in the past two or three years for the building of blast furnaces, by-product coke plant and presumably a steel plant of some capacity, on New York harbor. One publication connected Nicholas F. Brady, son of the late Anthony N. Brady, with a syndicate which is reported to have an option for this purpose on a large acreage on Newark Bay. It has also been denied that Mr. Brady has an interest in such a project. One newspaper makes the statement that the New York harbor blast furnace project is now coming forward because of the removal of the 15-cent duty on iron ore—quite an exaggeration of the importance of free iron ore as an inducement for the building of a tidewater iron and steel plant. The considerations involved are far greater in other directions. They have been turned over in one form and another for several years, as different interests have taken up the proposition. It is not to be expected that a definite decision will be reached concerning any proposal for a New York harbor steel plant until something definite comes out of the present uncertainty as to the effects of the new tariff.

Lackawanna Steel Company's Quarterly Earnings

The Lackawanna Steel Company and subsidiary companies report earnings for the quarter ended September 30, 1913, as follows, compared with the corresponding quarter last year:

	1913	1912
Income from manufacturing and operation after deducting all expenses incident thereto, including ordinary repairs and maintenance of plants and interest on bonds and fixed charges of subsidiary companies	$1,839,514	$1,033,944
Proportion of earnings on investment in companies not controlled, etc.	168,210	221,042
Total income	$2,007,724	$1,254,986
Interest	437,417	437,488
Sinking fund	113,495	108,941
Depreciation and rentals	347,609	322,301
Total deductions	898,521	868,728
Surplus	$1,109,202	$386,257
Unfilled orders, Sept. 30, tons	255,945	569,972

Unfilled orders September 30 were 255,945 tons, against 436,675 tons June 30.

Brier Hill Billets and Slabs Soon Available.—The Brier Hill Steel Company, Youngstown, Ohio, which has for some time been engaged in erecting an open-hearth steel plant, has advanced its building operations to a point at which it is seen that December deliveries can be made on slabs and billets. The company will be especially well situated to furnish 4-in. billets. A little later it will be in position to make deliveries on sheet and tin bars.

The Iron and Metal Markets

Some Slackening by Mills

Further Tendency to Lower Prices

Consumers' Stocks Low and There Is Urgency for Delivery on New Orders

There are further evidences this week of slackening operations at steel works, with the tendency to lower prices more pronounced in some lines. As is usual under such conditions exaggerated reports are current as to reductions in forces. An example is the statement that 50 per cent. of the employees at one large Chicago district steel plant are idle. Some workmen have been laid off in that district, but thus far they are not a large fraction of the total. In consuming industries no important curtailment has taken place thus far, though a reduction of working forces at automobile works in Detroit is scheduled.

The situation as to new business is that orders are almost entirely for early shipment, and all indications are that consumers' stocks are small and are being steadily drawn down. More and more orders are accompanied by requests to hurry shipments. With this means of knowing how large a volume of steel products is going directly into consumption sellers are only slowly yielding their position as to prices.

With its foreign business holding practically the same rate as in recent months, the Steel Corporation's bookings in September averaged 33,700 tons a day, or 250 tons a day more than in August. Shipments were under 41,000 tons a day, and there were some cancellations, making the net falling off in orders on hand 219,683 tons. Orders for the first half of October have been better than in the first half of September, though not up to the average for last month.

Sharper competition for plate business is making general the 1.35c. Pittsburgh price that smaller mills have been naming for some time. Eastern plate mills are more aggressive, and concessions from 1.35c., Pittsburgh, are possible. Plate makers are interested in inquiries seaboard shipyards have had for nine or ten vessels for foreign firms. Only the fact that British and Continental yards are filled up for many months gives American builders a chance at this business.

October has not yet brought the expected activity in rail contracts. The Nickel Plate has placed a second 5000-ton order, this one going to the Lackawanna Steel Company, and the Havana Central Railway has bought 3000 tons of Bethlehem rails. The Lorain mill has an order for 3500 tons of girder rails for the Tokio Street Railway in Japan. Car building is rather more promising. The Chicago & Northwestern order was for 2000 cars, divided between two Western shops. The Burlington has placed 500 steel cars and is reported to be in the market for 500 more. Over 1000 steel passenger cars are now up for estimate. At its Altoona shops the Pennsylvania Railroad will build 46 passenger locomotives.

While the bar market has heretofore been exempt from the weakness evident in other finished lines, it is now reported that business has been done in the Chicago district at less than the 1.40c. Pittsburgh basis. There have been concessions on bar mill shapes, sales of small angles being reported where regular extras were cut in two. Foreign bars have sold abroad at less than 1c. Antwerp, equivalent to about 1.25c. Philadelphia, but nothing has come of efforts to do business here.

Sheet mills are running at 50 to 75 per cent. of capacity. Jobbers have been more willing to contract than the mills to sell on a large scale at the present low level. At Chicago store prices on galvanized sheets have been reduced $4 a ton. In tin plate the probability of Welsh competition is not imminent, domestic manufacturers counting on holding their Eastern trade even at 5 to 15 cents a box higher than the delivered price of foreign plates.

Preference for domestic steel, even at a slightly higher price, is shown in a sale of 2500 tons of billets in eastern Pennsylvania by a Central Western steel company. At close to $25 delivered the domestic billets were about $1.50 higher than was quoted on basic Bessemer billets from Germany. Early delivery was a factor, also the uncertainty as to the foreign steel meeting specifications.

Some irregularity in pig iron prices has developed in the East and in all markets business has fallen off. Foundry buyers are looking for concessions from the prices recently asked by furnaces for 1914 delivery.

Heavy melting steel scrap has shown scarcely less resistance to the decline, at the low prices of the past two weeks, than at $1 or $2 a ton higher. At $11 in eastern Pennsylvania there has been some considerable buying.

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous.

	Oct. 15, 1913.	Oct. 8, 1913.	Sept. 17, 1913.	Oct. 16, 1912.
Pig Iron, Per Gross Ton:				
Foundry No. 2 X, Philadelphia	$16.00	$16.00	$15.85	$17.75
Foundry No. 2, Valley furnace..	13.85	13.85	14.00	16.25
Foundry No. 2 S'th'n, Cin'ti..	**14.50**	14.25	14.25	16.75
Foundry No. 2, Birmingham, Ala.	**11.25**	11.00	11.00	13.50
Foundry No. 2, furnace, Chicago*	15.00	15.00	15.00	17.00
Basic, delivered, eastern Pa...	*15.25*	15.50	15.25	17.50
Basic, Valley furnace.....	14.00	14.00	14.00	16.00
Bessemer, Pittsburgh	16.65	16.65	16.65	17.90
Malleable Bessemer, Chicago*...	15.00	15.00	15.00	17.00
Gray forge, Pittsburgh.....	14.40	14.40	14.25	16.40
Lake Superior charcoal, Chicago	15.25	15.25	14.75	18.75
Billets, etc., Per Gross Ton:				
Bessemer billets, Pittsburgh....	23.50	23.50	25.00	26.00
Open-hearth billets, Pittsburgh.	23.50	23.50	24.00	26.50
Open-hearth sheet bars, Pgh....	*24.00*	24.50	25.00	27.50
Forging billets, Pittsburgh.....	29.00	29.00	30.00	33.00
Open-hearth billets, Philadelphia	25.00	25.00	25.00	30.00
Wire rods, Pittsburgh.....	26.50	26.50	27.00	28.50
Old Material, Per Gross Ton:				
Iron rails, Chicago	14.00	14.00	14.00	17.50
Iron rails, Philadelphia.....	17.50	17.50	17.50	17.50
Carwheels, Chicago	*12.00*	12.25	12.75	16.00
Carwheels, Philadelphia.....	*12.25*	12.50	13.00	15.00
Heavy steel scrap, Pittsburgh...	12.00	12.00	12.25	16.00
Heavy steel scrap, Philadelphia	11.00	11.00	11.75	15.50
Heavy steel scrap, Chicago....	10.00	10.00	10.75	14.00
No. 1 foundry cast, Pittsburgh.	12.75	12.75	12.75	14.00
No. 1 foundry cast, Philadelphia	13.50	13.50	12.75	14.50
No. 1 foundry cast, Chicago (net ton)	10.50	10.50	10.50	14.25
Finished Iron and Steel, Per Pound to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Bessemer rails, heavy, at mill...	1.25	1.25	1.25	1.25
Iron bars, Philadelphia.....	1.32½	1.32½	1.35	1.60
Iron bars, Pittsburgh	1.55	1.55	1.55	1.50
Iron bars, Chicago.....	*1.25*	1.30	1.35	1.50
Steel bars, Pittsburgh	1.40	1.40	1.40	1.40
Steel bars, New York.....	1.56	1.56	1.56	1.56
Tank plates, Pittsburgh.....	*1.35*	1.40	1.40	1.45
Tank plates, New York.....	1.51	1.51	1.56	1.61
Beams, channels and angles, Pgh.	1.40	1.40	1.40	1.45
Beams, channels, angles, N. Y.	1.51	1.51	1.56	1.61
Skelp, grooved steel, Pittsburgh	1.35	1.35	1.35	1.40
Skelp, sheared steel, Pittsburgh	1.45	1.45	1.45	1.45
Steel hoops, Pittsburgh	1.60	1.60	1.60	1.45
Sheets, Nails and Wire, Per Pound to Large Buyers:				
Sheets, black, No. 28, Pittsburgh	2.05	2.05	2.15	2.25
Galvanized sheets, No. 28, P'gh..	3.10	3.10	3.15	3.40
Wire nails, Pittsburgh	1.65	1.65	1.65	1.70
Cut nails, f.o.b. Eastern mills..	1.70	1.70	1.70	1.70
Cut nails, Pittsburgh.....	1.55	1.55	1.60	1.65
Fence wire, ann'l'd, 0 to 9, Pgh.	1.45	1.45	1.45	1.50
Barb wire, galv., Pittsburgh...	2.05	2.05	2.05	2.10

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

Coke, Connellsville, Per Net Ton at Oven:	Oct. 15, 1913.	Oct. 8, 1913.	Sept. 17, 1913.	Oct. 16, 1912.
Furnace coke, prompt shipment	*$2.10*	$2.15	$2.25	$3.50
Furnace coke, future delivery..	2.25	2.25	2.25	2.60
Foundry coke, prompt shipment	*2.75*	2.90	2.90	3.75
Foundry coke, future delivery..	3.00	3.00	3.00	3.00

Metals, Per Pound to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Lake copper, New York.....	*16.62½*	16.87½	16.87½	17.75
Electrolytic copper, New York.	*16.37½*	16.50	16.75	17.62½
Spelter, St. Louis.....	*5.20*	5.30	5.65	7.40
Spelter, New York.....	*5.35*	5.45	5.80	7.55
Lead, St. Louis.....	*4.30*	4.42½	4.62½	4.90
Lead, New York	*4.45*	4.57½	4.75	5.05
Tin, New York.....	*40.35*	40.80	42.60	49.87½
Antimony, Hallett's, New York	*7.12½*	7.25	7.75	9.50
Tin plate, 100-lb. box, Pittsburgh	3.50	3.50	3.50	3.60

Finished Iron and Steel f.o.b. Pittsburgh

Freight rates from Pittsburgh in carloads, per 100 lb.: New York, 16c.; Philadelphia, 15c.; Boston, 18c.; Buffalo, 11c.; Cleveland, 10c.; Cincinnati, 15c.; Indianapolis, 17c.; Chicago, 18c.; St. Louis, 22½c.; Kansas City, 42½c.; Omaha, 42½c.; St. Paul, 32c.; Denver, 84½c.; New Orleans, 30c.; Birmingham, Ala., 45c.; Pacific coast, 80c. on plates, structural shapes and sheets No. 11 and heavier, 85c. on sheets Nos. 12 to 16; 95c. on sheets No. 16 and lighter; 65c. on wrought pipe and boiler tubes.

Plates.—Tank plates, ¼ in. thick, 6¼ in. up to 100 in. wide, 1.35c. to 1.40c., base, net cash, 30 days. Following are stipulations prescribed by manufacturers with extras:

Rectangular plates, tank steel or conforming to manufacturers' standard specifications for structural steel dated February 6, 1903, or equivalent, ¼ in. and over on thinnest edge, 100 in. wide and under, down to but not including 6 in. wide, are base.

Plates up to 72 in. wide, inclusive, ordered 10.2 lb. per sq. ft., are considered ¼-in. plates. Plates over 72 in. wide must be ordered ¼ in. thick on edge, or not less than 11 lb. per sq. ft., to take base price. Plates over 72 in. wide ordered less than 11 lb. per sq. ft. down to the weight of 3-16 in. take the price of 3-16 in.

Allowable overweight, whether plates are ordered to gauge or weight, to be governed by the standard specifications of the Association of American Steel Manufacturers.

Extras.	Cents per lb.
Gauges under ¼ in. to and including 3-16 in.....	.10
Gauges under 3-16 in. to and including No. 8.....	.15
Gauges under No. 8 to and including No. 9.....	.25
Gauges under No. 9 to and including No. 10.....	.30
Gauges under No. 10 to and including No. 12.....	.40
Sketches (including straight taper plates) 3 ft. and over	.10
Complete circles, 3 ft. in diameter and over.....	.20
Boiler and flange steel	.10
"A. B. M. A." and ordinary firebox steel.....	.20
Still bottom steel	.30
Marine steel	.40
Locomotive firebox steel	.50
Widths over 100 in. up to 110 in., inclusive.....	.05
Widths over 110 in. up to 115 in., inclusive.....	.10
Widths over 115 in. up to 120 in., inclusive.....	.15
Widths over 120 in. up to 125 in., inclusive.....	.25
Widths over 125 in. up to 130 in., inclusive.....	.50
Widths over 130 in.....	1.00
Cutting to lengths, under 3 ft., to 2 ft., inclusive.....	.25
Cutting to lengths, under 2 ft., to 1 ft., inclusive.....	.50
Cutting to lengths, under 1 ft.....	1.55

No charge for cutting rectangular plates to lengths 3 ft. and over.

Structural Material.—I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in. on one or both legs, ¼ in. thick and over, and zees, 3 in. and over, 1.40c. to 1.45c. Extras on other shapes and sizes are as follows:

	Cents per lb.
I-beams over 15 in.....	.10
H-beams over 18 in.....	.10
Angles over 6 in. on one or both legs.....	.10
Angles, 3 in. on one or both legs, less than ¼ in. thick, as per steel bar card, Sept. 1, 1909.....	.70
Tees, structural sizes (except elevator, hand rail, car-truck, and conductor rail).....	.05
Channels and tees, under 3 in. wide, as per steel bar card, Sept. 1, 1909.....	.20 to .80
Deck beams and bulb angles	.30
Hand rail tees	.75
Cutting to lengths, under 3 ft., to 2 ft. inclusive....	.25
Cutting to lengths, under 2 ft. to 1 ft. inclusive.....	.50
Cutting to lengths, under 1 ft.....	1.55

No charge for cutting to lengths 3 ft. and over.

Wire Rods and Wire.—Bessemer, open-hearth and chain rods, $26.50 to $27. Fence wire, Nos. 0 to 9, per 100 lb., terms 60 days or 2 per cent. discount in 10 days, carload lots to jobbers, annealed, $1.45; galvanized, $1.85. Galvanized barb wire, to jobbers, $2.05; painted, $1.65. Wire nails, to jobbers, $1.65.

The following table gives the price to retail merchants on fence wire in less than carloads, with the extras added to the base price:

Plain Wire, per 100 lb.

Nos.	0 to 9	10	11	12 & 12½	13	14	15	16
Annealed	$1.65	$1.70	$1.75	$1.80	$1.90	$2.00	$2.10	$2.20
Galvanized	2.10	2.10	2.15	2.20	2.30	2.40	2.80	2.90

Wrought Pipe.—The following are the jobbers' carload discounts on the Pittsburgh basing card on steel pipe (full weight), in effect from August 8, 1913, and iron pipe (full weight), from June 2, 1913:

Butt Weld.

Steel. Inches.	Black.	Galv.	Iron. Inches.	Black.	Galv.
⅛, ¼ and ⅜	73	52½	⅛ and ¼	66	47
½	77	66½	⅜	65	46
¾ to 3	80	71½	½	69	56
			¾ to 2½	72	61

Lap Weld.

2	76	67½	1¼	56	45
2½ to 6	78	69½	1½	67	56
7 to 12	75	64½	2	68	58
13 to 15	52	..	2½ to 4	70	61
			4½ to 6	70	61
			7 to 12	68	55

Reamed and Drifted.

1 to 3, butt	78	69½	1 to 1½, butt	70	59
2, lap	74	65½	2, butt	70	59
2½ to 6, lap	76	67½	1¼, lap	54	43
			1½, lap	65	54
			2, lap	66	56
			2½ to 4, lap	68	59

Butt Weld, extra strong, plain ends.

⅛, ¼ and ⅜	68	57½	⅜	63	52
½	73	66½	½	67	60
¾ to 1½	77	70½	¾ to 1½	71	62
2 to 3	75	71½	2 and 2½	72	63

Lap Weld, extra strong, plain ends.

2	73	64½	1½	65	59
2½ to 4	75	66½	2	66	58
4½ to 6	74	65½	2½ to 4	70	61
7 to 8	67	56½	4½ to 6	69	60
9 to 12	62	51½	7 and 8	63	53
			9 to 12	58	47

Butt Weld, double extra strong, plain ends.

½	63	56½	½	57	49
¾ to 1½	66	59½	¾ to 1½	60	52
2 to 2½	68	61½	2 and 2½	62	54

Lap Weld, double extra strong, plain ends.

2	63	56½	2	55	49
2½ to 4	65	58½	2½ to 4	60	54
4½ to 6	64	57½	4½ to 6	59	53
7 to 8	57	46½	7 to 8	52	42

The above discounts are subject to the usual variation in weight of 5 per cent. Prices for less than carloads are two (2) points lower basing (higher price) than the above discounts on black and three (3) points on galvanized.

Boiler Tubes.—Discounts to jobbers, in carloads on lap-welded steel, in effect from May 29, 1913, and standard charcoal-iron boiler tubes, in effect from January 1, 1913, are as follows:

Lap-Welded Steel.		*Standard Charcoal Iron.*	
1¾ and 2 in.	60	1½ in.	44
2¼ in.	57	1¾ and 2 in.	48
2½ and 2¾ in.	63	2¼ in.	44
3 and 3¼ in.	67	2½ to 2¾ in.	53
3½ to 4½ in.	69	3 and 3½ in.	55
5 and 6 in.	63	3½ to 4½ in.	58
7 to 13 in.	60		

Locomotive and steamship special grades bring higher prices.

2½ in. and smaller, over 18 ft., 10 per cent. net extra.
2¾ in. and larger, over 22 ft., 10 per cent. net extra.

Less than carloads will be sold at the delivered discounts for carloads, lowered by two points for lengths 22 ft. and under to destinations east of the Mississippi River; lengths over 22 ft., and all shipments going west of the Mississippi River must be sold f.o.b. mill at Pittsburgh basing discount, lowered by two points.

Sheets.—Makers' prices for mill shipment on sheets of U. S. Standard gauge, in carload and larger lots, on which jobbers charge the usual advance for small lots from store, are as follows, f.o.b. Pittsburgh, terms 30 days net or 2 per cent. cash discount in 10 days from date of invoice:

Blue Annealed Sheets.

	Cents per lb.
Nos. 3 to 8	1.55 to 1.60
Nos. 9 and 10	1.60 to 1.65
Nos. 11 and 12	1.65 to 1.70
Nos. 13 and 14	1.70 to 1.75
Nos. 15 and 16	1.80 to 1.85

Box Annealed Sheets, Cold Rolled.

Nos. 10 and 11	1.70 to 1.80
No. 12	1.70 to 1.80
Nos. 13 and 14	1.75 to 1.85
Nos. 15 and 16	1.80 to 1.90
Nos. 17 to 21	1.85 to 1.95
Nos. 22 and 24	1.90 to 2.00
Nos. 25 and 26	1.95 to 2.05
No. 27	2.00 to 2.10
No. 28	2.05 to 2.15
No. 29	2.10 to 2.20
No. 30	2.20 to 2.30

Galvanized Sheets of Black Sheet Gauge.

Nos. 10 and 11	2.10 to 2.20
No. 12	2.20 to 2.30
Nos. 13 and 14	2.20 to 2.30
Nos. 15 and 16	2.35 to 2.45
Nos. 17 to 21	2.50 to 2.60
Nos. 22 and 24	2.65 to 2.75
Nos. 25 and 26	2.80 to 2.90
No. 27	2.95 to 3.05
No. 28	3.10 to 3.20
No. 29	3.25 to 3.35
No. 30	3.40 to 3.50

Pittsburgh

PITTSBURGH, PA., October 15, 1913.

The whole market is still in a decidedly waiting attitude, consumers buying only such quantities of material as are absolutely needed for current wants. A feature of the situation is that requests are made for prompt shipment on nearly all orders placed. This indicates that stocks held by jobbers and consumers are at a low point for lack of confidence in the future, but there is no inclination to anticipate. The trade has had time to digest pretty thoroughly the new tariff duties, and the opinion is strong that domestic steel makers will not have as much to fear from foreign competition as was first assumed. It may be necessary to readjust prices to some extent on material for delivery near seaboard points, and this has already been done in several transactions. Hardly enough is being sold to test the market, but reports are current of sales of both finished and semi-finished material at prices somewhat lower than what are regarded as the market. A good deal of pessimism prevails, but back of it all is the strong fact that consumption of steel is still going on at a heavy rate, and the longer quietness prevails the more business will back up and will have to be taken care of by the mills later. There has been a slowing down in operations among some of the finishing mills and this is being felt in a decreased demand for semi-finished steel. The larger steel mills are still running to about full capacity, and are pretty comfortably fixed for the remainder of the year, unless cancellations should become heavier. Pig iron is fairly steady, but billets and sheet bars are weak, and sales of the latter are being made by smaller steel mills at $1 to $1.50 under prices quoted by the leading makers. New demand for sheets and tin plate is dull, but prices are holding fairly steady. Scrap and coke are neglected, with coke apparently destined to settle down to about $2 a ton at oven.

Pig Iron.—No sales of moment have been made and inquiry is confined to small lots to cover current needs. The Allegheny Steel Company, Brackenridge, Pa., has bought 500 tons of basic iron for prompt delivery at $14, Valley furnace, or $14.90, delivered. While prices of pig iron are low, consumers are evidently not convinced that they have touched bottom. It is claimed that in the entire country there is no more than four or five days' supply of pig iron in stock, and for this reason some in the trade figure that even a moderate buying movement might quickly improve prices. An inquiry is out for 1000 tons of low phosphorus Bessemer iron. We quote: Bessemer, $15.75; basic, $14 to $14.25; No. 2 foundry, $13.85 to $14; malleable Bessemer, $14.25 to $14.50, and gray forge $13.50, all at Valley furnace, the freight rate for delivery in the Pittsburgh or Cleveland district being 90c. a ton.

Billets and Sheet Bars.—Little new inquiry has come out for steel, and offerings are made of billets and sheet bars by the smaller mills for prompt delivery at $1 to $1.50 under prices named by leading makers. One sale of 500 tons of sheet bars for prompt delivery was made in the last few days at a very low price. Another sale is reported of 1000 tons of sheet bars for prompt delivery on the basis of $23.50, maker's mills, Youngstown. We quote open-hearth and Bessemer billets for prompt delivery and for shipment over the remainder of the year at $23 to $23.50, and Bessemer or open-hearth sheet bars for the same delivery at $23.50 to $24, maker's mill, Youngstown. We quote Bessemer and open-hearth billets at $23.50 to $24 and Bessemer and open-hearth sheet bars at $24 to $24.50 f.o.b., maker's mill, Pittsburgh. We quote forging billets at $29 to $30 and axle billets $25 to $26, maker's mill.

Steel Rails.—A fair amount of tonnage in standard sections is being placed in small lots for delivery this year, but as yet the important contracts for 1914 delivery have not come out. The demand for light rails continues active, the Carnegie Steel Company having received new orders and specifications in the past week for over 3000 tons. The output of the two rail mills of this company at Bessemer is pretty well sold up for the remainder of the year. We quote splice bars at 1.50c. per lb. and standard section rails at 1.25c. per lb. Light rails are quoted as follows: 25, 30, 35, 40 and 45 lb. sections, 1.25c.; 16 and 20 lb., 1.30c.; 12 and 14 lb., 1.35c., and 8 and 10 lb., 1.40c., all in carload lots, f.o.b. Pittsburgh.

Muck Bar.—Prospects are that three or four of the Pittsburgh and Mahoning Valley muck bar mills that have been closed since July 1 will be in operation before long. Local muck bar made from all pig iron is scarce, and as high as $33 to $34 is being offered for it, but without getting the bar. Eastern muck bar is still being offered at about $30.50 per gross ton, delivered in the Pittsburgh district.

Plates.—The local market is dull and prices are weak. The larger mills are adhering pretty closely to 1.40c. on sheared plates, but the smaller mills are naming 1.35c. or less. The Pennsylvania Railroad will build 46 passenger locomotives of the Atlantic type at its shops at Altoona, Pa., and part of the plates for these will come from local mills. The Carnegie Steel Company will furnish the plates and shapes, about 3000 tons, for new steel buildings to be built by the Broken Hill Proprietary Company, Ltd., New Castle, New South Wales, for which the Riter-Conley Mfg. Company has the contract. No important orders have been placed in steel cars and the market is bare of inquiry. We continue to quote ¼ in. and heavier plates at 1.40c., but this price is being shaded on some business $1 a ton or more.

Structural Material.—The new inquiry the past week was quieter than for some time. The Jones & Laughlin Steel Company has taken 300 tons for a new steel building for the A. J. Logan Company in this city; the McClintic-Marshall Construction Company has taken a pier shed for the Canton Company at Baltimore, Md., 400 tons, and the Fort Pitt Bridge Works has taken a county bridge at Brownsville, Pa., 1600 tons. We quote beams and channels up to 15 in. at 1.40c., Pittsburgh.

Wire Rods.—The market is quiet, and prices are weak. Specifications against contracts are not coming in very freely. We quote Bessemer, open-hearth and chain rods at $26.50 to $27, Pittsburgh.

Ferroalloys.—An inquiry is in the market from Canton, Ohio, for 100 tons of ferromanganese for forward delivery. Consumers are pretty well covered, and are holding off buying, believing there will be another reduction in prices before long. Two cars of German ferromanganese have been sold for delivery in this district on the basis of $49, Baltimore. Prices on ferrosilicon are firm, and we note sales of two cars of 50 per cent. at $75, delivered in the Pittsburgh district. We quote 80 per cent. foreign ferromanganese at $50, Baltimore, the freight rate to the Pittsburgh district being $2.16 a ton. We quote 50 per cent. ferrosilicon, in lots up to 100 tons, at $75; over 100 tons to 600 tons, $74; over 600 tons, $73, Pittsburgh. We quote 10 per cent. ferrosilicon at $22; 11 per cent., $23, and 12 per cent., $24, f.o.b. cars Jackson County, Ohio, or Ashland, Ky., furnaces. We quote 20 per cent. spiegeleisen at $25 at furnace. We quote ferrotitanium at 8c. per lb. in carloads; 10c. in 2000-lb. lots and over, and 12c. in lots up to 2000 lb.

Skelp.—New inquiry is light, but the skelp mills are pretty well filled for the next 60 days. Iron skelp continues scarce, and some mills are quoting higher prices. We quote grooved steel skelp at 1.35c. to 1.40c.; sheared steel skelp, 1.40c. to 1.45c.; grooved iron skelp, 1.60c. to 1.65c., and sheared iron skelp, 1.65c. to 1.70c., delivered to buyers' mills in Pittsburgh district.

Iron and Steel Bars.—The new demand for steel bars keeps up well, and prices are strong. Specifications from the railroads are active and shipments by the mills are heavy. The Board of Public Education in this city has ordered the erection of six new school houses which will take 1000 tons or more of concrete bars. Iron bars are quiet, and prices only fairly strong. We quote steel bars for forward delivery at 1.40c. and We quote iron bars at 1.55c. to 1.65c.

Sheets.—Mills continue to report that new business being placed is light in volume, consumers buying only for current wants. Specifications against contracts are fair, but operations among the sheet mills are showing a steady decline, owing to the falling off in business. Several of the leading makers are not operating to over 50 per cent. of capacity, while others are probably running to 75 per cent. Jobbers are still anxious to place contracts for long delivery ahead at present prices, but as a rule the mills are refusing to accept these, as they believe the market on sheets will be better. Prices are fairly strong and have shown no decided change in the last week. We quote Nos. 9 and 10 blue annealed sheets at 1.60c. to 1.65c.; No. 28 Bessemer black, 2.05c. to 2.10c.; No. 28 galvanized, 3.10c. to 3.15c.; No. 28 tin mill black plate, H. R. and A., 2.05c. and Nos. 29 and 30, 2.10c. These prices are f.o.b., Pittsburgh, in carload and larger lots, jobbers charging the usual advances for small lots from store

Tin Plate.—It is between seasons, and very little new business is being placed, while the large consumers have not yet come in the market for next year delivery. It is believed that between November 1 and 15 there

will be a good buying movement, but the mills are not agitating the matter of contracts for next year on account of the unsatisfactory condition of the steel market and their lack of advices as to what can be done in making contracts for steel for next year. Several prominent tin plate makers have stated they do not have much fear of Welsh competition, with present prices, and have been assured by some large consumers that a preference of 5c. to 15c. per box would be given American plate over foreign. Specifications against contracts are quiet, and shipments of tin plate by the mills are lighter than for some time, a good part of the product now being made going into stock. As a rule tin plate mills are operating anywhere from 50 to 75 per cent. capacity, but few of them are running as high as the latter figure. We quote 100 lb. cokes at $3.50 and 100 lb. ternes at $3.35 in large lots, f.o.b., Pittsburgh.

Railroad Spikes.—New demand continues very quiet and only for small lots to cover current needs. Railroads are not placing any new contracts, and specifications for some time have been light. Hardly enough new business is being placed to make a market. We quote railroad spikes in base sizes, 5½ x 9/16 in., at $1.65 to $1.70, and small railroad and boat spikes in carload and larger lots at $1.75 to $1.80 per 100 lb., f.o.b. Pittsburgh.

Bolts and Rivets.—Makers of nuts and bolts report that new demand is keeping up fairly well, but is mostly for small lots to meet current needs. In rivets new demand is also only fair, and mostly for small lots, with specifications against contracts of moderate volume. Regular prices on rivets and also on nuts and bolts continue to be shaded. We quote button-head structural rivets at $1.90 in large lots and $2 in small lots, and cone-head boiler rivets at $2 in large lots and $2.10 in small lots, terms 30 days net, less 2 per cent. for cash in 10 days. Regular discounts on nuts and bolts are as follows in lots of 300 lb. or over, delivered within a 20c. freight radius of maker's works:

Coach and lag screws	80 and 10% off
Small carriage bolts, cut threads	75 and 5% off
Small carriage bolts, rolled threads	75 and 10% off
Large carriage bolts	70 and 2% off
Small machine bolts, cut threads	75 and 10% off
Small machine bolts, rolled threads	75, 10 and 5% off
Large machine bolts	70 and 7½% off
Machine bolts with C.P.C. and T nuts, small	75 and 5% off
Machine bolts with C.P.C. and T nuts, large	70% off
Square hot pressed nuts, blanked and tapped	$5.70 off list
Hexagon nuts	$6.30 off list
C.P.C. and R. square nuts, tapped and blank	$5.70 off list
Hexagon nuts, ⅝ and larger	$6.60 off list
Hexagon nuts, smaller than 9/16	$7.20 off list
C.P. plain square nuts	$5.20 off list
C.P. plain hexagon nuts	$5.50 off list
Semi-finished hexagon nuts, ⅝ and larger	85% off
Semi-finished hex. nuts, smaller than 9/16	85 and 10% off
Rivets, 7/16 x 6½, smaller and shorter	75, 10 and 10% off
Rivets, metallic tinned, bulk	3½c. per lb. net extra
Rivets, tin plated, bulk	1½c. per lb. net extra
Rivets, metallic tinned, packages	70, 10 and 10% off
Standard cap screws	75, 10, 10 and 7½% off
Standard set screws	75, 10, 10 and 7½% off

Shafting.—Present conditions in the shafting trade are regarded as particularly unsatisfactory. New demand is very dull, and large consumers, notably the automobile trade, are not specifying against contracts. Current new business is not over 35 per cent. of capacity, and most of the shafting makers are operating at 60 to 75 per cent., running largely on old orders. A discount of 62 per cent. from list makes a flat price of $1.90, delivered, and with 18c. freight to Chicago the price figures back to $1.72, Pittsburgh. With steel bars at 1.40c. the spread is only 32c. per 100 lb. between bars and shafting, and it is claimed shafting makers that buy their own bars in the open market cannot profitably put them into shafting for 32c. Of course higher prices are paid for specialties, and this affords relief. We quote cold-rolled shafting at 62 per cent. off in carload and larger lots and 55 to 60 per cent. off in small lots, delivered in base territory.

Hoops and Bands.—Most consumers are covered and new demand is quiet, with specifications against contracts coming in at a fair rate. We continue to quote bands at 1.40c., extras as per the steel bar card, and steel hoops at 1.60c., Pittsburgh. If any desirable business were offering it is probable these prices would be shaded.

Wire Products.—Wire and wire nails are quiet, and new business is only for small lots. The jobbing trade covered its requirements ahead some time ago and is sending in fairly liberal specifications to the mills. There is considerable unevenness in prices, one or two mills continuing to name $1.60 on wire nails and $1.40 on plain annealed wire. Other makers state they are not yet meeting these prices, but will do so if necessary to protect their trade. We quote: Wire nails to jobbers, $1.65; cut nails, $1.60; plain annealed wire, $1.45; galvanized barb wire, $2.05, and painted barb wire, $1.65, f.o.b. Pittsburgh, per 100 lb., usual terms, actual freight added to point of delivery. As stated the above prices are being shaded by several mills at least $1 a ton.

Merchant Steel.—New demand continues very quiet and only in small lots, and contracts have been pretty well cleaned up, so that shipments by the mills at present are lighter than for some time. In sympathy with other lines of finished material, prices on merchant steel have shown a decline and we now quote as follows: Iron-finished tire, 1½ x ½ in. and larger, 1.35c., base; under 1½ x ½ in., 1.50c.; planished tire, 1.55c.; channel tire, ¾ to ⅞ and 1 in., 1.85c. to 1.95c.; 1¼ in. and larger, 1.95c.; toe calk, 1.95c. to 2.05c., base; flat sleigh shoe, 1.70c.; concave and convex, 1.75c.; cutter shoe, tapered or bent, 2.25c. to 2.35c.; spring steel, 195c. to 2.05c.; machinery steel, smooth finish, 1.80c. We quote cold-rolled strip steel as follows: Base rates for 1 in. and 1½ in. and wider, under 0.20 carbon, and No. 10 and heavier, hard temper, 3.25c.; soft, 3.50c.; coils, hard, 3.15c.; soft, 3.40c.; freight allowed. The usual differentials apply for lighter gauges and sizes.

Standard Pipe.—Mills report a fair new demand for butt weld sizes, while for lap weld new business is heavier. The National Tube Company has taken 16 miles of 16 and 12-in. pipe for the Quapaw-Wichita Natural Gas Company. Several large gas and oil lines are under way, but these may not develop this year, as it is late, and it will take considerable time to secure rights of way and perfect financial arrangements. The larger pipe mills report they are pretty well filled up with actual orders to the end of the year. New demand for oil country goods continues active, several mills stating they are back in deliveries 4 to 6 weeks or longer. Discounts on iron and steel pipe are only fairly well maintained.

Boiler Tubes.—New business has quieted down very much, demand for both locomotive and merchant tubes being lighter at present than for some time. There is some competition to secure new business, and discounts on iron and steel boiler tubes are being materially shaded.

Old Material.—Leading consumers not placing any new orders and only small lots are moving. Prices are weak, and on any desirable tonnage it is likely our quotations would be shaded. While a good deal of scrap is pressing the market to find sale, dealers are holding to the belief that prices will probably not go any lower, and as large consumers have not been buying for some time, they look for an improvement in this direction in the very near future. Cast iron borings are in fair request and are somewhat scarce. A sale is reported of 300 tons at $8.25 delivered, buyer's mill. Turnings are slightly weaker and have sold below $7 per gross ton delivered. Dealers are quoting as follows, per gross ton, for delivery in the Pittsburgh district:

Selected heavy steel scrap, Steubenville, Follansbee, Brackenridge, Sharon, Monessen, Midland and Pittsburgh delivery	$12.25 to $12.50
Ordinary steel scrap	12.00 to 12.25
Compressed side and end sheet scrap	10.50
No. 1 foundry cast	12.75 to 13.00
No. 2 foundry cast	11.50 to 11.75
Bundled sheet scrap, f.o.b. consumers' mills, Pittsburgh district	7.25 to 7.50
Rerolling rails, Newark and Cambridge, Ohio, Cumberland, Md., and Franklin, Pa.	13.75
No. 1 railroad malleable stock	11.50 to 11.75
Grate bars	8.25 to 8.50
Low phosphorus melting stock	15.25 to 15.50
Iron car axles	24.50 to 25.00
Steel car axles	17.50 to 17.75
Locomotive axles, steel	21.00 to 21.50
Locomotive axles, iron	25.50 to 26.00
No. 1 busheling scrap	12.00 to 12.25
No. 2 busheling scrap	7.50 to 7.75
*Machine shop turnings	6.75 to 7.00
Old carwheels	13.75 to 14.00
*Cast-iron borings	8.25 to 8.50
†Sheet bar crop ends	14.00 to 14.25
Old iron rails	14.50 to 14.75
No. 1 railroad wrought scrap	13.75 to 14.00
Heavy steel axle turnings	9.00 to 9.25
Stove plate	8.25 to 8.50

*These prices are f.o.b. cars at consumers' mills in the Pittsburgh district.
†Shipping point.

Coke.—Not enough coke is being sold to establish a market. New inquiry is very light, and as yet no demand has developed for furnace or foundry coke for next year delivery. Small lots of furnace coke, ranging from 50 to 100 cars, are being sold at prices ranging from $2.10 to $2.20 per net ton at oven. There is a

fair demand for foundry coke, but most consumers are covered by contracts. Several large coke makers are of the opinion that prices on furnace coke will shortly settle down to about $2 a ton. We quote standard makes of furnace coke for delivery over remainder of the year at $2.10 to $2.25, but one leading interest claims it is still holding firm at $2.50 at oven. We quote best makes of 72-hr. foundry coke at $2.75 to $3 per net ton at oven.

Chicago

CHICAGO, ILL., October 13, 1913.

The market tendencies toward lower prices which have been reflected in these reports in the past few weeks are now even more pronounced. With the exception of tubes, bands, hoops, wire products and pig iron, steel and iron products may be bought to-day at lower levels than a week ago. Buyers of steel, particularly those who are able to place desirable tonnages, are claiming that they can do 1.35c., Pittsburgh, on plates and can shade 1.40c. Pittsburgh, on structural shapes and steel bars. The market on sheets has weakened perceptibly and quotations $1 a ton below those last quoted are the general rule. Store prices on galvanized sheets have been reduced $4 a ton. The failure of a number of large transactions to materialize, particularly with reference to railroad purchases, has had a discouraging effect. The only exceptions to the almost complete withdrawal of the railroads from the market are the purchase of 2000 cars by the Chicago & Northwestern Railway and a comparatively liberal buying of bar iron and machine bolts. The local pig-iron market has been exceedingly flat, with little or no inquiry. The furnace position as to price remains unchanged. Scrap values continue to slump, with no diminution of a supply apparently available in the face of a decreasing demand from consumers. The increasingly conservative attitude of those who control the financial situation is beginning to have a depressing influence in several instances with tangible effect.

Pig Iron.—The crest of the buying wave in pig iron has distinctly passed, and current transactions are no more than the tapering off into the trough of the quiet period which ordinarily follows. There was little or no new inquiry during the week, with no sales of general importance. The furnace position is unaltered for charcoal and Lake irons, delivered prices for the former in Chicago continuing at a minimum of $15.25. Local foundry iron is held at $15, f.o.b. furnace, and $11.50, Birmingham, continues to be the market quotation for Southern iron, except for October shipment, for which delivery some grades can be purchased on the basis of $11.25. The following quotations are for iron delivered at consumers' yards, except those for Northern foundry, malleable Bessemer and basic iron, which are f.o.b. furnace and do not include a local switching charge averaging 50c. a ton:

Lake Superior charcoal, Nos. 1, 2, 3, 4	$15.25 to $15.75
Northern coke foundry, No. 1	15.50 to 16.00
Northern coke foundry, No. 2	15.00 to 15.50
Northern coke foundry, No. 3	14.50 to 15.00
Southern coke, No. 1 foundry and No. 1 soft	16.10 to 16.60
Southern coke, No. 2 foundry and No. 2 soft	15.60 to 16.10
Southern coke, No. 3	15.10 to 15.60
Southern coke, No. 4	14.60 to 15.10
Southern gray forge	14.60 to 15.10
Southern mottled	14.10 to 14.60
Malleable Bessemer	15.00 to 15.50
Standard Bessemer	18.40
Basic	15.00 to 15.50
Jackson Co. and Kentucky silvery, 6 per cent	18.40
Jackson Co. and Kentucky silvery, 8 per cent	19.40
Jackson Co. and Kentucky silvery, 10 per cent	20.40

Rails and Track Supplies.—The prolonged delay accompanying the placing of rail orders has had a discouraging influence despite the fact that the buying programs of most of the railroads have been made known to the mills. In a large measure the railroads are also postponing the placing of contracts for track fastenings. Hope is now being pinned to the proposed increase of 5 per cent. in freight rates east of the Mississippi as the avenue of relief from the financial pressure which is undoubtedly back of current railroad retrenchments. We quote standard railroad spikes at 1.70c. to 1.75c., base; track bolts with square nuts, 2.25c., base, all in carload lots, Chicago; tie plates, $30 to $32, net ton; standard section Bessemer rails, Chicago, 1.25c., base; open hearth, 1.34c.; light rails, 25 to 45 lb., 1.25c.; 16 to 20 lb., 1.30c.; 12 lb., 1.35c.; 8 lb., 1.40c.; angle bars, 1.50c., Chicago.

Structural Material.—Reports as to how far the structural mills will make concessions for desirable tonnage vary according to the source of the statement. Buyers maintain that orders for prompt shipment can be placed freely on the basis of 1.40c., Pittsburgh, and less, while the general attitude of the mills is one of maintaining full prices. It can no longer be questioned that a number of the larger mills are operating on reduced schedules and are accordingly especially keen for business for immediate rolling. Contracts for fabricated steel placed during the week include 225 tons for the French Bank building at San Francisco and 500 tons for the Physicians' building in the same city, both awards being made to the Ralston Iron Works. At Chicago the only tonnage noted was a contract for 127 tons for Swift & Co. The Lake street bridge at Chicago, for which approximately 2000 tons of steel will be required, has not yet been formerly awarded, although bids have been received. For the Jackson street bridge about 1200 tons will be required, but this is some distance in the future. It is stated that the contract has been awarded to the American Bridge Company for the steel for the new plant of the Baldwin Locomotive Works at Calumet. The Chicago & Northwestern Railway has placed its contracts for 2000 cars awarding 1000 to the American Car & Foundry Company and 1000 to the Western Steel Car Company. The Mobile & Ohio Railroad is in the market for 500 cars, and there are inquiries for miscellaneous passenger equipment which will aggregate a like number. We quote for Chicago delivery, 1.58c.

Although the total tonnage of structural business out of store has declined, in step with the general falling off in demand, the number of orders for small lots has been maintained at a high rate. We continue to quote from store for Chicago delivery 1.95c.

Plates.—Where desirable tonnages are offered for prompt delivery, as in the instance of 1000 tons for which quotations were asked at Chicago, it has been found that prices based on 1.35c., Pittsburgh, are made with little hesitation by a number of the mills. The general business is light, and, with the prospect of order books gradually thinning down, the weakness already apparent has in it little promise of quick recovery. We quote for Chicago delivery from mill 1.53c. to 1.58c.

For delivery of plates out of jobbers' stocks we continue to quote 1.95c.

Sheets.—The decrease in available new business in sheets has been accompanied by a corresponding increase in determination of some of the mills to keep their full capacity in operation. The result has been further concessions in prices, and 2.05c., Pittsburgh, for black sheets and 3.05c. for galvanized are generally obtainable. While certain of the mills continue to report their mills operating at full capacity, specifications are so varied in character as to considerably reduce the tonnage output. We quote for Chicago delivery from mill: No. 10 blue annealed, 1.78c.; No. 28 black, 2.33c.; No. 28 galvanized, 3.33c.

In keeping with the decline in prices of sheets from mill, the price of galvanized sheets out of store has been reduced from the basis of 4c. for No. 28 to 3.80c., with a further discount of 10c. per 100 lb. on orders of 25 bundles or over. For other grades of sheets we continue to quote without change as follows: No. 10 blue annealed, 2.15c.; No. 28 black, 2.75c.; No. 28 galvanized, 3.80c.

Bars.—As a result of purchases of bar iron by the railroads in quantities much more liberal than their buying in other directions, local mills have operated during the past week at practically full capacity. But the placing of this tonnage was accompanied by a still further decline in the price of bar iron, and business is commonly taken at 1.25c. Steel bar specifications have been of a routine character without special interest. We quote for mill shipment as follows: Bar iron, 1.25c., soft steel bars, 1.58c.; hard steel bars, 1.40c. to 1.50c.; shafting in carloads, 60 per cent. off; less than carloads, 55 per cent. off.

For delivery from store we quote soft steel bars, 1.85c.; bar iron, 1.85c.; reinforcing bars, 1.85c. base, with 5c. extra for twisting in sizes ½ in. and over, and usual card extras for smaller sizes; shafting 55 per cent. off.

Rivets and Bolts.—Some of the Western railroads have been encouragingly active in specifying against their bolt contracts, but the price irregularities that have so long characterized the market for these products continue unabated and our quotations are purely nominal. The quotations for rivets make a showing but little better and the ordinary incidental order may be placed as low as 1.95c., Chicago. We quote from mill as follows: Carriage bolts up to ⅜ x 6 in., rolled thread, 75-10-7½; cut thread, 75-12½; larger sizes, 70-12½; machine bolts up to ⅜ x 4 in., rolled thread, 75-10-12½; cut thread, 75-10-7½; large size, 70-10-5;

coach screws, 80-12½-5; hot pressed nuts, square head, $6 off per cwt.; hexagon, $6.70 off per cwt. Structural rivets, ¾ to 1¼ in., 1.98c. to 2.03c., base, Chicago, in carload lots; boiler rivets, 10c. additional.

Out of store we quote for structural rivets, 2.70c., and for boiler rivets, 2.90c. Machine bolts up to ⅜ x 4 in., 70-5-10; larger sizes, 70-7½; carriage bolts up to ⅜ x 6 in., 75-5; larger sizes, 70-7½ off. Hot pressed nuts, square head, $5.50, and hexagon, $6.20 off per cwt.

Wire Products.—Makers of wire products are strongly entrenched behind the piled-up orders accumulated during the recent buying movement, and this branch constitutes one of the few firm elements in the general market. Specifications are reported as coming in at a very satisfactory rate, and for the present at least these products are carrying but little of the burden of the general market heaviness. Prices to jobbers are as follows: Plain wire, No. 9 and coarser, base, $1.63; wire nails, $1.83; painted barb wire, $1.83; galvanized, $2.20; polished staples, $1.83; galvanized, $2.15, all Chicago.

Cast-Iron Pipe.—A number of small orders for pipe have been placed in the West, among them 600 tons at Failfield, Ill., awarded to the United States Cast Iron Pipe & Foundry Company; 400 tons at Kansas City, Mo., placed with the American Cast Iron Pipe Company, and 215 tons bought for Elgin, Ill. Pipe prices are somewhat firmer than they have been, reflecting the improved position of pig iron. We quote as follows, per net ton, Chicago: Water pipe, 4-in., $28; 6 to 12 in., $26; 16-in. and up, $25, with $1 extra for gas pipe.

Old Material.—Comment regarding the local market for scrap is necessarily limited to the fact that the material available greatly exceeds the demand. It is with considerable difficulty that cars on tracks are placed with consumers, and this is only accomplished in many instances by sacrifices in price. For a number of grades of material we note declines of 25c. per ton. The railroad offering of last week include a blank list from the Lake Shore & Michigan Southern, 1750 tons from the Michigan Central and 600 tons from the Chicago & Alton. We quote for delivery at buyers' works, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton.

Old iron rails	$14.00 to $14.50
Old steel rails, rerolling	12.25 to 12.75
Old steel rails, less than 3 ft.	11.25 to 11.75
Relaying rails, standard section, subject to inspection	24.00
Old carwheels	12.00 to 12.50
Heavy melting steel scrap	10.00 to 10.50
Frogs, switches and guards, cut apart	10.00 to 10.50
Shoveling steel	9.50 to 10.00
Steel axle turnings	7.25 to 7.75

Per Net Ton.

Iron angles and splice bars	$13.25 to $13.75
Iron arch bars and transoms	13.00 to 13.50
Steel angle bars	9.25 to 9.75
Iron car axles	20.25 to 20.75
Steel car axles	14.50 to 15.00
No. 1 railroad wrought	9.75 to 10.25
No. 2 railroad wrought	8.75 to 9.25
Cut forge	8.75 to 9.25
Steel knuckles and couplers	9.75 to 10.25
Steel springs	9.75 to 10.25
Locomotive tires, smooth	11.00 to 11.50
Machine shop turnings	4.50 to 5.00
Cast and mixed borings	4.50 to 5.00
No. 1 busheling	8.25 to 8.75
No. 2 busheling	6.50 to 7.00
No. 1 boilers, cut to sheets and rings	7.00 to 7.50
Boiler punchings	10.25 to 10.75
No. 1 cast scrap	10.50 to 11.00
Stove plate and light cast scrap	9.50 to 10.00
Railroad malleable	9.50 to 10.00
Agricultural malleable	9.00 to 9.50
Pipes and flues	7.50 to 7.75

Philadelphia

PHILADELPHIA, PA., October 14, 1913.

Buying has been comparatively light in practically all lines. Consumers will not buy for forward delivery, particularly as price weakness is in evidence. Less anxiety as to sharp foreign competition is apparent. A sale of a round lot of Western rolling billets was made in eastern Pennsylvania at close to $25 delivered, in competition with foreign billets at $23.35 delivered. Uncertainty as to foreign specifications was a factor. The demand for finished iron and steel product even for current miscellaneous material, has been lighter. The movement in pig iron has been smaller. Some foundry grades have been available at 10c. to 15c. below recent minimum quotations. Basic for this year's delivery has been sold down to about $15.25 delivered. Consumption is heavy, and the statistical position in connection with pig iron is good. The movement in railroad materials is light and shipbuilding material comes out slowly. Coke is easy. Old materials show a further recession in price.

Iron Ore.—Business is at a standstill. Importations during the week ending October 11 included 1000 tons from Spain, 8094 tons from Sweden, 38,200 tons from Cuba, 2000 tons from Newfoundland and 2600 tons from Venezuela.

Pig Iron.—It is evident, from the attitude of buyers, that stocks in consumers' yards are comparatively light. Urgent delivery purchases make up the bulk of the buying, and furnaces are being urged to hasten deliveries on contract iron. That shipments have been heavy during the past month is shown by the statistics compiled by the Eastern Pig Iron Association, which indicate a decrease of 10 per cent. in stocks on hand. Aggregate stocks on banks of furnaces in the association are now less than 100,000 tons. Orders show a slight recession, as may be expected with recent lighter buying. The movement in foundry grades has been on narrow lines. As a rule, small sales, seldom exceeding 100 tons, make up the bulk of the business, with prices for standard brands of eastern Pennsylvania No. 2 X foundry ranging from $16 to $16.25 delivered, over the remainder of the year. Less desirable brands, however, are said to be available at $15.85 to $15.90 delivered, but no business has yet been reported at the latter figures. There is still a good demand for low grade foundry iron from cast-iron pipe makers. A belated report of a sale of 5000 tons of No. 3 foundry and off grade iron to a Delaware River foundry at $15.25 delivered is confirmed. Several small lots of off grade irons have also been moved at prices ranging from $15 to $15.25 delivered. The importation of foreign iron is no longer seriously considered. Virginia foundry iron has been selling in small lots at $13 at furnace for No. 2 X for delivery over the remainder of the year. Some little forward business is being figured on, and it is stated that some makers have quoted $13 at furnace for No. 2 plain for first quarter shipments, although the disposition has been to withhold quotations for extended shipment. Rolling mill forge iron has again become more active. One Schuylkill Valley producer-consumer has put out an inquiry for 3000 to 5000 tons, for delivery this year, and several small tonnages have been sold at $15 to $15.25 delivered. There has been some further movement in steel making grades, particularly basic, of which a 1000-ton lot, for delivery this year, was sold at close to $15.25 delivered. Several small prompt lots were sold for urgent central Pennsylvania shipment at $15.50 delivered. One inquiry for several thousand tons of basic, for first quarter, is noted, while a local buyer is feeling around for several thousand tons for shipment over the remainder of the year. Low phosphorus iron has been in light demand and sales have been confined to odd lots at unchanged prices. Negotiations for supplies of pig iron, in any grade, involving delivery during the first quarter or half of 1914 have been held in abeyance, pending a clearer insight as to the future. Prices, while unchanged, do not show the same strength they did a few weeks ago, as the decrease in buying is beginning to have the usual effect on some makers. The following range represents the market for standard brands, delivered in buyers' yards, in this vicinity, over the remainder of the year:

Eastern Pennsylvania No. 2 X foundry	$16.00 to $16.25
Eastern Pennsylvania No. 2 plain	15.75 to 16.00
Virginia No. 2 X foundry	15.80 to 16.25
Virginia No. 2 plain	15.75 to 16.00
Gray forge	15.00 to 15.25
Basic	15.25 to 15.50
Standard low phosphorus	23.00 to 23.50

Ferroalloys.—There has been no demand for 80 per cent. ferromanganese for forward shipment, and current business has been confined to occasional 100-ton and carload lot business, usually placed at $50, seaboard, although odd prompt sales of German ferromanganese have been rumored at 50c. under that figure. Ferrosilicon has been in comparatively small demand.

Billets.—The most important transaction last week was a sale of 2500 tons of basic open-hearth rolling billets, delivery starting at once and continuing over the remainder of the year, by a Western mill to an eastern Pennsylvania consumer at close to $25 delivered. This was in competition with foreign steel, which was offered at $23.35 delivered, but doubt as to the ability of the latter to meet specifications resulted in the business going to the domestic maker. Current small orders for both rolling and forging billets have been less numerous. In fact, toward the close of the week there was almost an entire absence of demand. Quotations are

largely nominal, although $25 delivered about represents the market for domestic basic open-hearth rolling billets and $30 for ordinary analysis forging billets.

Plates.—Reports of easiness in prices continue to be heard, but, as far as can be learned, the market has not been seriously tested. On current general business prices range from 1.55c. to 1.60c. delivered in this district. New business has been a shade lighter and mills report specifications on contracts as coming in more slowly.

Structural Material.—No important new projects have come out. Current small lot business is reported lighter, and mills are becoming more anxious for business. Shading of the recent price of 1.55c., delivered, for plain shapes is more frequently heard of. Some makers state that concessions would be available if anything worth while came up for estimate. Ordinary small lot business continues to be taken at prices ranging from 1.55c. to 1.60c., delivered in this district.

Sheets.—Business has been considerably lighter. Eastern mills have caught up with orders for some sizes and are now rolling for stock. It has been some time since mills have been able to accumulate any stock. Prices are unchanged, Western No. 10 blue annealed sheets being quoted at 1.75c. to 1.80c., delivered in this district, which prices are met by Eastern producers.

Bars.—Little business has been moving in iron bars. Orders are usually small, but specifications against contracts have been fairly good. Most mills are fairly well occupied. Prices are unchanged but are inclined to weakness, quotations ranging from 1.32½c. for ordinary iron bars up to 1.42½c. for the better grades, delivered in this vicinity. Specifications against steel bar contracts are good, and the price is unchanged at 1.55c., delivered here.

Coke.—The demand has been less active, while offerings have come out more freely. Small sales of standard furnace coke for delivery over the remainder of the year have been made at $2.25 at oven while less desirable brands can be had at lower figures. Spot coke has been bought at $2.15 for standard, while off grades are available down to $1.90. Foundry coke is quiet at unchanged prices. The following range of prices, per net ton, is named for delivery in buyers' yards in this district:

Connellsville furnace coke	$4.25 to $4.65
Connellsville foundry coke	4.90 to 5.35
Mountain furnace coke	4.00 to 4.25
Mountain foundry coke	4.50 to 4.75

Old Material.—Sales continue to be made in a number of grades at the expense of prices. Consumers' offering prices, usually below recent quotations, are being accepted by some sellers, with the result that the market has become rather unsettled. Some heavy tonnages of No. 1 heavy melting steel have been purchased recently in this market, buyers forcing prices down from $11.50 to $11, delivered. One 5000-ton purchase was made at the latter figure. Rolling mill grades also show a downward tendency, small lot sales going at lower figures. Borings and turnings are practically uncalled for. Both railroad grates and stove plate have sold at lower figures. Prices are very irregular and to a considerable extent nominal. An approximate range for delivery in buyers' yards in this district, covering eastern Pennsylvania, taking freight rates varying from 35c. to $1.35 per gross ton, is as follows:

No. 1 heavy melting steel	$11.00
Old steel rails, rerolling (nominal)	$14.00 to 14.50
Low phosphorus heavy melting steel scrap (nominal)	16.00
Old steel axles	18.00 to 18.50
Old iron axles (nominal)	25.00
Old iron rails	17.50 to 18.00
Old carwheels	12.25 to 12.75
No. 1 railroad wrought	14.00
Wrought-iron pipe	10.75 to 11.00
No. 1 forge fire	9.00 to 9.50
No. 2 light iron (nominal)	6.00
No. 2 busheling (nominal)	8.00 to 8.25
Wrought turnings	7.75 to 8.00
Cast borings	7.75 to 8.00
Machinery cast	13.50 to 14.00
Grate bars, railroad	9.00 to 9.50
Stove plate	9.50 to 10.00
Railroad malleable (nominal)	11.00 to 11.50

The Empire Steel & Iron Company is about to blow out the single Crane furnace which has been in operation at its Catasauqua, Pa., plant, leaving the Oxford furnace in New Jersey as the company's only active stack.

Cincinnati

CINCINNATI, OHIO, October 15, 1913.—(*By Telegraph.*)

Pig Iron.—The market is stagnant, and even the small buyers who need iron for melting this year are holding off making any purchases except to fill urgent requirements. The inquiries previously reported from Indiana are yet unclosed, and it is reported that the larger prospective consumers in that territory have postponed indefinitely purchasing for a first half supply. The limited carload demand for foundry iron in this section is attributed to a considerable extent to the absence of executive heads who are attending the foundrymen's convention in Chicago. In the face of existing conditions, Southern furnace operators appear to have been able to establish a minimum price of $11.50, Birmingham, for any shipments this year, and as far as is known all business is being taken at this figure. Neither malleable nor basic is in demand at the present time, but a number of orders for both of these grades have to be closed if melters are to be protected for their first half requirements. This is also true with foundry iron users, and contracting may commence any moment. Northern foundry is firm at $14, Ironton, but this price is possible on first quarter business and could be extended through the first half. Based on freight rates of $3.25 from Birmingham and $1.20 from Ironton we quote, f.o.b. Cincinnati, as follows:

Southern coke, No. 1 foundry and 1 soft	$15.00 to $15.50
Southern coke, No. 2 foundry and 2 soft	14.50 to 15.00
Southern coke, No. 3 foundry	14.00 to 14.50
Southern, No. 4 foundry	13.50 to 13.75
Southern gray forge	13.00 to 13.50
Ohio silvery, 8 per cent. silicon	18.20 to 18.70
Southern Ohio coke, No. 1	16.20 to 16.70
Southern Ohio coke, No. 2	15.20 to 15.70
Southern Ohio coke, No. 3	14.95 to 15.45
Southern Ohio malleable Bessemer	15.20 to 15.45
Basic, Northern	15.20 to 15.45
Lake Superior charcoal	16.25 to 17.25
Standard Southern carwheel	27.25 to 27.75

(*By Mail*)

Coke.—The large tonnage of Connellsville furnace coke that was loaded on cars last week was disposed of below the regular market quotations. In some cases as low as $2 per net ton at oven was accepted, although the brands offered at this figure were not considered standard. However, on prompt shipment 48-hr. coke $2.15 is no unusual price, with contract quotations ranging from $2.25 to $2.50. On both Pocahontas and Wise County brands there has also been a reduction in spot coke prices and a number of cars were disposed of around $2.25 per net ton at oven to get them out of the way. The average contract price on furnace coke in both the last-named districts ranges from $2.25 to $2.50. In all three fields there is very little future shipment business being booked. As a natural consequence foundry coke has weakened with furnace grades, but hardly as much. The average quotation for 72-hr. grades is around $2.75 to $3 for either prompt or first quarter shipment. There is practically no buying except to fill immediate requirements.

Old Material.—Leading dealers do not see anything in the immediate future to develop a change for the better. Prices are softer than for a long time and there are really no stable quotations on any class of scrap. The minimum figures given below represent what buyers are willing to pay for delivery in their yards, southern Ohio and Cincinnati, and the maximum quotations are dealers' prices f.o.b. at yards:

Per Gross Ton.	
Bundled sheet scrap	$7.00 to $7.50
Old iron rails	12.00 to 12.50
Relaying rails, 50 lb. and up	19.75 to 20.25
Rerolling steel rails	11.00 to 11.50
Melting steel rails	9.50 to 10.00
Old carwheels	10.75 to 11.25
Per Net Ton.	
No. 1 railroad wrought	$9.00 to $9.50
Cast borings	4.50 to 5.00
Steel turnings	4.50 to 5.00
No. 1 cast scrap	9.00 to 9.50
Burnt scrap	6.50 to 7.00
Old iron axles	16.75 to 17.25
Locomotive tires (smooth inside)	10.25 to 10.75
Pipes and flues	6.00 to 6.50
Malleable and steel scrap	7.50 to 8.00
Railroad tank and sheet scrap	4.75 to 5.25

Finished Material.—Both black and galvanized sheets are showing some improvement, but there is little buying for future shipment. The mills in this section have no cause for complaint on specifications coming in on orders previously booked. There are no changes in local quotations. No. 28 black sheets are quoted, in

carloads, at 2.20c. to 2.25c., and galvanized sheets around 3.25c., f.o.b. Cincinnati. Structural material is very sluggish. Mill agencies are keen in soliciting small orders that a year ago would probably be overlooked. However, this particular business appears to be of an intermittent nature this fall, and the coming week may bring out a number of inquiries calculated to stimulate the trade temporarily, at least. Railroad track material is probably in better demand, but no large orders are being placed.

Cleveland

CLEVELAND, OHIO, October 14, 1913.

Iron Ore.—The operation of ore boats was greatly interfered with the past week by fogs so that vessels are behind in their schedules. As a result some wild tonnage has been placed and about all the available boats have been lined up for cargoes this week. October shipments are not expected to show much falling off as compared with September. Shippers aim to get well cleaned up before severe weather sets in, as no late-in-the-season buying, which was expected for some time, has developed. Shippers will be able to close the season earlier and the movement after November 1 is expected to be very light. We quote prices as follows: Old range Bessemer, $4.40; Mesaba Bessemer, $4.15; old range non-Bessemer, $3.50; Mesaba non-Bessemer, $3.40.

Pig Iron.—Some Valley furnaces have taken on foundry iron contracts extending through the first half at $14 for No. 2. Others are still asking $14.25. However, very little business is coming out and the minimum price can be shaded about 15c. for prompt shipment. Both buyers and sellers are playing a waiting game. Buyers feel that there will be no advance in prices for the first half delivery, and in view of present business conditions and the uncertainty as to the effect the new tariff will have on business, they are inclined to defer placing contracts for the first half. Some recent inquiries for iron for that delivery have not resulted in the placing of orders and the general feeling is that it will be several weeks before there is much activity in the market. Most consumers are fully supplied for their last quarter requirements. Consumers generally are taking all their iron and the fact that consumption is being well maintained is an encouraging feature. For prompt shipment and for the last quarter we quote delivered Cleveland as follows:

Bessemer	$16.65
Basic	14.90
Northern No. 2 foundry	$14.65 to 15.00
Southern No. 2 foundry	15.35 to 15.85
Gray forge	14.25
Jackson County silvery, 8 per cent. silicon	18.55 to 19.05

Coke.—Very little business is coming out in either furnace or foundry grades. Foundries are mostly under contract and there is very limited demand for spot foundry coke. Prices are steady. Most Standard Connellsville foundry grades are quoted at $3 per net ton at oven. Some makes can be had at a lower price and one or two producers are asking $3.20. Connellsville furnace coke is quoted at $2.15 to $2.25 for prompt shipment and contract.

Finished Iron and Steel.—New demand is very light, but specifications are holding up fairly well. There are rumors, so far unconfirmed, that a price readjustment will be announced October 15, and this report has caused some buyers to hold off. The most important development in the price situation is the more aggressive attitude assumed by some of the larger producers in respect to plate and structural business. These mills, no longer content to allow others to take the business with lower prices, are now meeting competition. Plates are weaker than other lines. The 1.35c. price has become more general, and this quotation is being shaded at least 50c. a ton. On structural material the 1.40c. price has become quite general. Steel bars continue very firm in this market at 1.40c., but there are reports that lower prices have been named in the Chicago territory. In spite of lower prices in both the East and West bar iron is being well maintained in this market at 1.40c., Cleveland, but there is practically no demand. Sheet prices appear to be well maintained at the recent low level of 2.05c. for No. 28 black, 3.05c. to 3.10c. for No. 28 galvanized and 1.60c. for No. 10 blue annealed. New structural work that has come out includes 1000 tons for a garment factory to be built by the H. Black Company, Cleveland, for which bids will be received October 17. The plans provide for Bethlehem sections. The general contract for the new shop buildings to be erected by the Cleveland Railway Company, requiring 800 tons of steel, has been awarded to Walter I. Thompson & Son, Cleveland. The National Iron & Wire Company has taken 175 tons for a new bath house to be erected by the city of Cleveland in Edgewater park. The Lackawanna Steel Company has taken 5000 tons of 85-lb. rails for the Nickel Plate Railroad, this purchase supplementing one for approximately a similar tonnage made a few weeks ago from the Illinois Steel Company. Warehouse business is not active. Stock prices are unchanged at 2c. for steel bars and 2.10c. for plates and structural material, but a readjustment with lower prices on the latter two items in the near future is not improbable.

Old Material.—Local mills are buying in very small lots, and then only such scrap as is offered at very low prices. Consumers' stock are said to be low, but mills do not care to buy for future requirements. Dealers are waiting for better prices and are not trying to make many sales. While they think that the bottom has been reached they see no indications of an early advance. A large list from the Big Four Railroad and also a Michigan Central Railroad list will be closed this week. We quote, f.o.b. Cleveland, as follows:

Per Gross Ton.	
Old steel rails, rerolling	$13.00 to $13.50
Old iron rails	14.00
Steel car axles	17.00 to 17.50
Heavy melting steel	10.50 to 10.75
Old carwheels	12.00 to 12.50
Relaying rails, 50 lb. and over	23.00 to 25.00
Agricultural malleable	9.50 to 10.00
Railroad malleable	11.00 to 11.50
Light bundled sheet scrap	7.50 to 8.00
Bundled tin scrap	11.00 to 11.50
Per Net Ton.	
Iron car axles	$20.00 to $21.00
Cast borings	5.75 to 6.00
Iron and steel turnings and drillings	4.50 to 4.75
Steel axle turnings	7.00 to 7.50
No. 1 busheling	9.00 to 9.50
No. 1 railroad wrought	10.50 to 11.00
No. 1 cast	11.00 to 11.25
Stove plate	8.50 to 8.75

Birmingham

BIRMINGHAM, ALA., October 13, 1913

Pig Iron.—One furnace company reports the sale of an aggregate of 5000 tons during the week, of which 1500 tons was for the last quarter and 1000 tons for the first quarter. The same price, $11.50, was secured in every case, the company claims. Another reports the sale of 4000 tons during the week for delivery this year, all on the $11.50 basis. Some makers continue to quote $12 for 1914 delivery, but none so quoting claims to have made sales at that figure. Brokers report the same conditions. All sales have been for actual consumption. The accumulations have dwindled to the point where they cannot be considered as figuring in price making, there being little really good iron left on the yards, according to best information. The company which had the largest stock two months ago claims to have cleared its yards of all good iron. Production meanwhile remains on the same level as was started in June, when the high monthly records of 184,000 tons and 179,000 tons in April and May dropped to 163,000 tons. The Tennessee furnaces likewise are maintaining their smaller production, the average having fallen from 31,000 tons in May to 13,000 tons monthly since that time. The report that the Woodstock furnaces might be placed in blast is not considered seriously. There is no prospect of increase of production in the South at this time. Manufacturers fail to report any evidences of market effects produced by the new tariff. We quote, per gross ton, f.o.b. Birmingham furnaces (the high figures representing exceptional sales) as follows:

No. 1 foundry and soft	$12.00 to $12.50
No. 2 foundry and soft	11.50 to 11.75
No. 3 foundry	11.00 to 11.25
No. 4 foundry	10.75 to 11.00
Gray forge	10.50 to 10.75
Basic	11.50 to 11.75
Charcoal	24.50 to 25.00

Cast-Iron Pipe.—General conditions in the cast-iron pipe trade do not appear to have improved, owing to lack of large orders from municipalities. The United States Cast Iron Pipe & Foundry Company has secured large orders for its Alabama factories from Panama, Illinois, and the Far West, but no other large ones are reported. Other plants appear to be accumulating stock. Prices obtained are not satisfactory, not being on a par with the advance in pig iron. However, additional purchases of pig iron by pipe interests are reported. We quote

4-in. pipe, per net ton, f.o.b. plants, at $22, and 6-in. and upward at $20, with $1 added for gas pipe. These prices are not understood to be firm.

Coal and Coke.—Coal and coke have been quieter, especially coke. Efforts to dispose of the output of foundry coke were not altogether successful last week. Prices, however, have not declined, as the slight slump is not regarded as lasting. We quote per net ton at oven as follows: Furnace coke, $3 to $3.50; foundry, general run, $3.75; special, $4 to $4.25.

Old Material.—A fairly good business was done last week. The general demand for all grades is reported as quite good, as evidenced by the inquiries. Dealers are disposed to take on stocks in anticipation of early sales. Light cast and stove plate have been good sellers and prices have been maintained. We quote, per gross ton, f.o.b. dealers' yards, as follows:

Old iron axles (light)	$15.00 to $15.50
Old steel axles (light)	15.00 to 15.50
Old iron rails	12.50 to 13.50
No. 1 railroad wrought	12.00 to 12.50
No. 2 railroad wrought	10.00 to 10.50
No. 1 country wrought	9.50 to 10.00
No. 2 country wrought	8.50 to 9.00
No. 1 machinery cast	10.00 to 10.50
No. 1 steel scrap	10.50 to 11.00
Tram carwheels	10.50 to 11.00
Standard carwheels	12.00 to 12.50
Light cast and stove plate	8.50 to 9.00

German Prices Going Still Lower

Pig Iron Reduced for First Half of 1914—Wire Rods Marked Down

BERLIN, October 2, 1913.

The chief events of the week have been the reduction in prices of pig iron and wire rods. On September 30 the Pig-Iron Syndicate voted the following reductions for the first half of 1914: Hematite, 2 to 3 marks, (48c. to 71c.); foundry No. 2, 2 to 3 marks, (48c. to 71c.); No. 3, 3 to 4 marks (71c. to 95c.); Siegerland qualities, including spiegeleisen, 3 marks, (71c.). The cut on rods is 5 marks ($1.19), making the new price 117.50 marks ($27.96.) It takes effect for the current quarter. The association voted to begin taking orders for the first quarter of 1914 also at the reduced price.

It is pretty generally expected that prices not protected by trade organizations will go still lower. Recent reductions made by the Steel Works Union appear still to be without marked effect on the trade, though it is mentioned that there is more active buying of beams. The feeling is generally pessimistic. Nevertheless, the foreign demand for some classes of German products remains pretty good; and, in general, manufacturers are better satisfied with the foreign than with the home trade.

German pig-iron producers are feeling more keenly the competition of foreign furnaces, yet notwithstanding the unpromising outlook at home and abroad some of the big companies in the southwest are preparing to erect new furnaces. The Burbach-Eich-Düdelingen combination will build two, while others will be built at Rombach, Knutingen, and Differdingen.

The demand for scrap is light. In view of the very low prices of finished products, the open-hearth works are buying a minimum of scrap, and they are squeezing prices to the lowest possible level. They are favored in this by the fact that much material is coming upon the market.

In the semi-finished steel line the foreign demand is quieter, but home deliveries are being called for pretty briskly, considering the general state of business. On the other hand, there are no reports showing that buying has been stimulated by the recent price reduction; and it is feared that orders for this quarter will turn out of considerably lower volume than hitherto. The mills have been accumulating stocks to a greater extent than previously and are trying to market these accumulations. Under these circumstances further cuts in steel prices are regarded as probable.

Reports on Finished Iron and Steel

Bars remain in a very unsatisfactory position. Prices are still weakening. Though the general home price is about 95 marks ($22.61), with some mills that are well supplied with orders charging 1 to 2 marks (24c. to 48c.) more than this—there are also cheaper offers in the market. It is attracting attention in the Essen region that the Peiner Rolling Mill (situated near Hanover) is availing itself of its favorable location to sell bars in the direction of Berlin at 93.50 marks ($22.25), with the usual discount. Work in hand will hold most of the mills for the rest of the year, and a few have orders even longer ahead. Iron bars are in a fairly satisfactory situation, with mills still running on full time. The Luxemburg-Lorraine district, which exports a very large proportion of its product, reports a good foreign business in soft steel bars.

Heavy plates are still doing badly. Sales as low as 102 marks ($24.28) by some of the new mills are mentioned by an Essen newspaper, though the general price is about 104 marks ($24.75), and some reports still quote 106 to 108 marks ($25.23 to $25.70). There are still many complaints about over-production. The mills are exerting themselves to unload plates on the foreign markets. A Siegen report says shipments for export are going forward from there at 101 marks ($24.04), loaded on cars.

Hot-rolled bands have further lost ground. One report mentions 120 to 125 marks ($28.56 to $29.75) as the lowest prices; but according to Essen advices prices of 116 to 118 marks ($27.61 to $28.08) are commonly quoted, only special grades commanding 120 to 122 marks ($28.56 to $29.04). Cold-rolled bands are so low that they hardly cover the cost of manufacture; as some reports have it, they are even below that level already. For this reason big consumers are trying to get in orders for long periods.

The home trade in wire and wire nails is very slack, but foreign business is active. Export prices, however, are so low that the mills have little satisfaction in taking foreign orders.

Gas and boiler piping are still in a bad way. Prices have further given way under the sharp competition between the two big groups of producers. Both of them increased their rebates, taking effect yesterday, and prices are now near the point where profits disappear.

A Big Inquiry for Rails

An inquiry has been received by the Steel Works Union for 2,000,000 tons of rails for Siberian railroads. It is apparently of a very tentative character.

A new plate mill is being built at Havelburg, on the Havel River, near its junction with the Elbe, to supply the Berlin market, especially the great electrical companies, with plates of superior quality. It is called the Weber Rolling Mill from its owner, but it is surmised that he is acting in concert with the great Burbach-Eich-Düdelingen Company, which, if this guess is correct, would of course furnish the supply of slabs.

The Belgian market is still on the down grade. There was last week an almost general reduction of export prices by 2s. 6d. (61c.)—bands to 122s. to 125s. ($29.79 to $30.42), basic bars to 90s. to 92s. ($21.90 to $22.39), thin plates to 112s. ($27.25), medium to 107s. ($26.03), and heavy to 104s. to 105s. ($25.30 to $25.55). The dispatch stating these changes adds that they were made to meet German competition and in view of the lack of orders. Another Brussels dispatch of to-day says that home prices for bands, bars and heavy plates of basic steel have just dropped 2.50 francs (48c.).

St. Louis

ST. LOUIS, Mo., October 13, 1913.

With both sides of the market waiting for the other to make the next move and practically all transactions on the hand to mouth basis, there is still great firmness of prices except scrap.

Pig Iron.—Business was for the most part in small lots. Meanwhile urgency of calls for shipment can readily be regarded as proof that foundries are working up close to their supplies and are taking only actual requirements. The belief here is that either there must come a sharp renewal of buying or else there will be a series of shutdowns. Prices are firmly held at $11.50 for No. 2 Southern, Birmingham basis, for last and first quarter and $12 for first half, with Ohio iron shaded slightly from $14, Ironton basis, and Chicago No. 2 X $15 at furnace.

Coke.—There was one sale of about 1500 tons and several smaller lots. Furnace coke is held a little above the market here at $2.25 to $2.40, while foundry coke is commanding $3 in the small lots being sold. By-product coke is quotable at $5.80, St. Louis delivery.

Finished Iron and Steel.—Demands for material under existing contracts continues to be active, but there is comparatively little new business being placed. For the most part an early improvement is being

looked for. Fabricators are still reasonably busy and using fair quantities of structural material, with orders ahead sufficient to keep them from worrying very much about the near future. The state of the business and the condition of their yards is such as to relieve them from the necessity of pressing new orders to assure delivery. Bars are still in fair request for quick shipment, but there is not much doing in forward shipment. Plates are very weak and there is practically nothing doing. No business has come out in standard steel rails, the railroads still being inclined to keep away from the market. Light rails are in only light request, chiefly from the coal interests. Track fastenings are also quiet.

Old Material.—There is only pessimism to be found in the scrap market. The conditions reported last week have been intensified and prices are again marked down, not because there is any business at the figures given, but because the dealers do not know what else to do. As a matter of fact, it is doubtful if any business could be placed at the figures given, while conditions generally are reported as the worst that this market has seen in more than a decade. The consumers continue to take material, even on contracts already made, and the dealers, compelled to carry some quantities in their yards, are naturally disinclined to make any further purchases. The lists out during the week include one of 2000 tons from the Frisco, one of 200 from the Vandalia and several others are expected with consequent depression of the market. We quote dealers' prices, f.o.b. St. Louis, which would run about 50 cents higher with delivery to local industries:

Per Gross Ton.

Old iron rails	$11.00 to $11.50
Old steel rails, rerolling	11.50 to 12.00
Old steel rails, less than 3 feet	8.50 to 9.00
Relaying rails, standard section, subject to inspection	22.50 to 23.00
Old carwheels	9.50 to 10.00
Heavy melting steel scrap	8.25 to 8.75
Shoveling steel	7.50 to 8.00
Frogs, switches and guards cut apart	8.00 to 8.50

Per Net Ton.

Iron angle bars	$9.50 to $10.00
Steel angle bars	7.00 to 7.50
Iron car axles	17.00 to 17.50
Steel car axles	13.00 to 13.50
Wrought arch bars and transoms	11.00 to 11.50
No. 1 railroad wrought	8.25 to 8.75
No. 2 railroad wrought	7.50 to 8.00
Railroad springs	7.00 to 7.50
Steel couplers and knuckles	7.00 to 7.50
Locomotive tires, smooth	9.00 to 9.50
No. 1 dealers' forge	7.50 to 8.00
Mixed borings	3.00 to 3.50
No. 1 busheling	7.00 to 7.50
No. 1 boilers, cut to sheets and rings	4.00 to 4.50
No. 1 cast scrap	8.00 to 8.50
Stove plate and light cast scrap	6.00 to 6.50
Railroad malleable	7.00 to 7.50
Agricultural malleable	5.50 to 6.00
Pipes and flues	5.00 to 5.50
Railroad sheet and tank scrap	4.00 to 4.50
Railroad grate bars	5.50 to 6.00
Machine shop turnings	3.50 to 4.00
Bundled sheet scrap	3.00 to 3.50

Lower Wages in Great Britain

A Result of the Depression in Iron and Steel—American Inquiries for Steel

(By Cable)

LONDON, ENGLAND, October 15, 1913.

Markets are all depressed and wages at iron and steel works are falling. A development in the pig-iron trade is American inquiry for low phosphorus pig iron. Americans have also asked prices on semi-finished steel and on some finished forms, including bars. Guest, Keen & Co. have sold 11,000 tons of rails for South Africa. Pig iron warrant stocks are 170,716 tons, an increase of 670 tons from last week. We quote as follows:

Tin plates, cokes, 14 x 20, 112 sheets, 108 lb. f.o.b. Wales, 12s. 10½d. ($3.13) against 13s. 1½d. ($3.19.), a week ago.

(The following prices are per ton of 2240 lb.):

Cleveland pig-iron warrants (Tuesday), 52s. ($12.65) against 53s. 1d. ($12.91) a week ago.

No. 3 Cleveland pig iron, makers' price f.o.b. Middlesbrough, 52s. 6d. ($12.77), against 54s. ($13.14) a week ago.

Ferromanganese, £9 17s. 3d. ($48).

Steel sheet bars (Welsh), delivered at works in Swansea Valley, £4 15s. ($23.11).

Steel bars, export, f.o.b. Clyde, £6 10s. ($31.63).

Steel joists, 15-in., export f.o.b. Hull or Grimsby, £5 17s. 6d. ($28.59).

Steel ship plates, Scotch, delivered local yards, £7 7s. 6d. ($35.89).

Steel black sheets, No. 28, export f.o.b. Liverpool, £9 ($43.79), a decline of 5s.

Steel rails, export, f.o.b. works port, £6 7s. 6d. ($31.02).

(The following prices are per export ton of 1015 kilos, equivalent to 2237.669 lb.):

German sheet bars, f.o.b. Antwerp, 87s. 6d. ($21.23).

German 2-in. billets, f.o.b. Antwerp, 80s. ($19.46).

German basic steel bars, f.o.b. Antwerp, £4 10s. ($21.89), as against £4 12s. ($22.38) a week ago.

German joists, f.o.b. Antwerp, £5 8s. to £5 11s. ($26.28 to $27.01).

(By Mail)

Continental Price Cutting Gives Much Concern—Not Certain That Bottom Is Reached

LONDON, October 4, 1913.

The pig iron market continues in the doldrums, with not the slightest sign of returning activity either on the part of the consuming or of the speculative element. Under these circumstances price fluctuations have been quote unimportant. The sensational story of the purchase by Philadelphia pipe founders of 50,000 tons of Cleveland pig iron for near shipment and the reports circulated here that iron was being loaded at present for this destination are quite impossible of confirmation. The whole tale is regarded as mythical by those in position to know. There must have been a pretty steady demand for iron, however, from home and overseas connections, even if no great fuss was made about it, for the shipments from the Tees for September were quite good.

German Aggressiveness Causes Alarm

There is no denying the sluggishness of trade now, however, and every one is frightened at the reports brought from Germany as to the conditions prevailing there. That they must be bad is shown by the prices at which big works are eagerly touting for orders. One of the largest is accepting 90s. ($21.90) a ton, f.o.b. Antwerp, for basic steel bars, while plates have been sold at £5 5s. ($25.55), f.o.b., and look weak even at this rate. It is impossible for the British trade to hold itself together with Continental price-cutting going on at this rate, and the utmost concern is expressed as to what the outcome of the position will be. The steel trade has been cut all to pieces and within the last few days the Scottish, North East of England and Midland Steelmasters' associations have decided to reduce their minimum selling prices by 10s. a ton. This applies to all kinds of steel for the home trade and in part to export business. The reduction was forced upon makers by the slackness of demand and the fierceness of foreign competition. Consumers have been holding out from buying, as they felt convinced that prices would have to come down again, and it is by no means certain that the market has yet reached bottom. The secession of the Glengarnock works is a blow at the associations, and it remains to be seen what will be the sequel. So far nothing has happened. Official prices are now £8 2s. 6d. ($39.54) per gross ton for boiler plates, £7 7s. 6d. ($35.88) for ship plates, £7 ($34.06) for angles and £8 ($38.93) for bars, all less 5 per cent. for Clyde delivery, or equal to it.

A few decent sized rail orders have been placed this week, including a pretty big line for the Commonwealth of Australia, which as already notified you by cable was divided between Bolckow, Vaughan & Co., of Middlesbrough, and the Lithgow works of Australia. The price named by the British firm was £6 7s. 6d. ($31.02), f.o.b., or close to it. Much discontent is expressed at the fact that Commonwealth authorities, after calling for tenders for an additional 7000 tons of rails and 6000 tons of fishplates, should have withdrawn the inquiry for lack of funds. It is not a square thing, it is felt, to put manufacturers to the expense of bidding if afterward the potential business is withdrawn for the reason stated. A fair number of Indian rail orders, mostly small ones, have been taken, one for 10,000 tons having gone to Guest, Keen & Co.

The output of 77,000 tons spread over 25 vessels from Clyde shipyards during September constitutes a record for that month. The total output of 488,000 tons for the nine months exceeds by 16,000 tons that for the corresponding period of last year, which was a record, and the huge figures are attributable to the big proportion of liners among the launches.

San Francisco

SAN FRANCISCO, CAL., October 7, 1913.

Comparatively little has yet been accomplished toward a readjustment of values and conditions on the basis of the new tariff, which is expected to have considerable effect in this market. Some material which was held in bonded warehouses has been released, consisting principally of pig iron, with a small tonnage of structural shapes and light rails, but no great amount of new business has been booked by importers, who have so far been rather uncertain as to prices. Domestic manufacturers have not yet announced definitely what policy will be adopted to meet foreign competition, and apparently some time will elapse before the readjustment is completed. Meanwhile the larger buyers are holding off almost entirely, buying only for immediate needs, though a larger movement is expected before long. Some slight curtailment is also noted in distributive trade.

Bars.—Importers continue to quote 1.75c. on the basis of the old tariff, and are expected to put out quotations based on the new tariff within a few days, but desire more time to study the schedule before announcing the change. What course will be followed by Eastern and local mills is still uncertain, values having been maintained so far. Some iron bars have been released from bond, but very little steel, and as far as can be learned there is no large tonnage of foreign bars in transit to this port. Merchants report a satisfactory distributive trade, but buying for stock is about at a standstill. It is expected that good-sized orders will soon be placed with importers, though this tendency may be checked to some extent by an announcement of policy on the part of American mills. There has been a good movement of reinforcing bars, local mills having taken some good-sized contracts for building here and at Los Angeles, though at the moment there is hesitation in placing new orders. Resale prices on small lots remain at 2.50c. for steel and 2.40c. for iron.

Structural Material.—A very fair tonnage has been placed in the last fortnight, mostly in small orders, though a few good jobs have been let. No award has yet been announced on the Hobart building, but it will probably be closed in a few days. Dyer Bros. have received the award on the Horticulture Building of the exposition, and the Physicians' Building contract has been placed with the Ralston Iron Works, which also has a small job at Larkin and Olive streets. The Schrader Iron Works has a small job on the Sacred Heart Academy. It is reported that the American Bridge Company is low bidder on the new buildings at the Puget Sound Navy Yard. Bids will soon be taken on a seven-story frame hotel at Sixteenth and Clay streets, Oakland. Morgan, Walls & Morgan, architects, are preparing plans for a large office building at Broadway and Seventh street, Los Angeles. Some foreign steel has been used by local fabricators for several years, but the prospect of increasing tonnage under the new tariff will depend largely on the measures taken by Eastern mills to meet competition.

Rails.—Some logging concerns in the north coast States are figuring on railroad extension, but local business is exceptionally quiet. Orders for standard sections are small and scattering, and light rails, of which there is a considerable tonnage in store, are not moving.

Sheets.—No further decline is noted, but buyers are waiting for more tangible signs of firmness before increasing their orders, and are still buying in the smallest possible quantities. The demand for corrugated sheets is larger than a month ago, but hardly up to last year.

Plates.—Distributive business is rather quiet, and while a fair tonnage is needed for current operations, the larger consumers are limiting their specifications pretty closely to actual requirements. There is still considerable tank business in sight. It is reported that a large storage plant will be built for the Standard Oil Company near Antioch, Cal.

Standard Pipe.—Business seems to be rather unevenly distributed among local jobbers, and on the whole the movement is hardly normal for this time of year. Mill agents report local business exceptionally light, with orders extremely small and not very numerous. Oil country goods also are rather quiet. The Southern California Gas Company is taking figures on a 24-mile line, but there is no certainty that the order will be placed.

Cast-Iron Pipe.—The Daly City order for 150 tons has been placed with the United States Cast Iron Pipe & Foundry Company, but no business of special importance has been done. While there is considerable in prospect, no notable inquiries are in the market at present. An encouraging feature is a slight increase of corporation business, which has been extremely dull for several months.

Pig Iron.—Since the removal of the duty, values have been rather unsettled, a reduction of about $2.50 per ton being made in practically all grades of foreign iron, of which there was a considerable tonnage in bonded warehouses. Very little business has been done so far, though a good movement of English and Chinese iron is expected shortly. The foundry trade, however, is quiet, and consuming requirements are lighter than usual. Notwithstanding the recent report that the Hanyang furnace would be unable to make large shipments, the Robert Dollar Company, this city, has further shipments due to arrive in December and January.

Coke.—Prices have dropped, the local spot quotation for German Syndicate coke being $14 to $14.50 per net ton, while coke for shipment or in transit is quoted at $12 to $12.50 per gross ton. Supplies are large, and about 10 vessels, probably averaging about 1000 tons each, are due to arrive between now and January. Foundries are well supplied, and business is quiet.

Old Material.—While there is no heavy demand in any line, the movement is fairly steady, preventing any excessive accumulation, and values are well maintained. Prices are as follows: Cast-iron scrap, per net ton, $17 to $18; steel melting scrap, per gross ton, $12; wrought-iron scrap, per net ton, $13 to $15; rerolling rails, per net ton, $15 to $16.

Buffalo

BUFFALO, N. Y., October 14, 1913.

Pig Iron.—The market in this district is still marking time, with very little new business except for present necessities. Most foundries appear well covered for their immediate needs and are not inclined to provide for forward requirements until they see a little more definitely what the trend of prices is going to be as a result of tariff enactments. Railroads are apparently lopping off all possible expense in their buying programme, and this is expressing itself in curtailed business placed with foundries that cater to the railroad trade, quite numerous in this district. Producers do not anticipate, however, that this period of pronounced cessation will be of more than short duration. Prices are fully as firm as they have been for the past week or two, and we quote last week's schedule without change, for delivery over fourth quarter f.o.b. furnace:

No. 1 foundry	$14.25 to $15.00
No. 2 X foundry	14.00 to 14.50
No. 2 plain	14.00
No. 3 foundry	13.75 to 14.00
Gray forge	13.75
Malleable	14.00 to 14.50
Basic	14.50 to 14.75
Charcoal, regular brands	15.50 to 16.50
Charcoal, special brands and analysis	17.00 to 19.50

Finished Iron and Steel.—New business has consisted almost entirely of small lot orders. Bar prices are being maintained at 1.40c. One independent interest advises that forward contracts for steel bars covering delivery to the first of April have been written at 1.40c. Structural material is being offered more freely to important users on the basis of 1.40c., bringing the price of shapes more uniformly to the basis of plates and bars, although considerable business is being booked for small quantities at prices varying from 1.45c. to 1.50c. As a rule purchasers are holding off on the placing of forward contracts and buying in the open market for immediate needs. On sheets the market is rather "spotty," and very little movement is reported in tin plate, although the price at which large tonnages were placed in Canada last week are stated to have been very low to meet Welsh competition. There is a general feeling among buyers that with the marked reduction in duty there must be a reduction in the present level of tin plate prices. The week has shown something of an easing up in fabricated structural lines and less new business is coming out for figures. Bids were taken this week for the new printing plant of the J. W. Clement Company, Buffalo, requiring about 200 tons, and for a bottling works for the Schreiber Brewing Company, Buffalo, 100 tons. Bids are also soon to be taken for the factory and power plant of the Quaint Art Furniture Company, Syracuse, requiring 150 tons. The Buffalo Structural Steel Company will supply a

small tonnage for the Iroquois Bag Company, Buffalo, and the Lackawanna Bridge Company has contracts for the foundry building of the Somers Mfg. Company, Buffalo, and a cold storage plant for the Medina Cold Storage Company, Medina, N. Y., the latter taking about 150 tons.

Old Material.—The chief commodities that are showing life are borings and turnings, for which there has been a continuance of a fairly active demand reported during the past few weeks. The local demand for cast scrap is keeping up in a lesser degree and heavy melting steel is still being shipped to the Pittsburgh district. In other lines transactions have been very light. Prices are unchanged from last week. We quote as follows per gross ton f.o.b. Buffalo:

Heavy melting steel	$10.50 to $11.00
Boiler plate, sheared	12.50 to 13.25
Bundled sheet scrap	8.00 to 8.50
No. 1 busheling scrap	10.50 to 11.00
No. 2 busheling scrap	8.00 to 8.50
Low phosphorus steel scrap	16.50 to 17.00
Iron rails	15.00 to 15.50
No. 1 railroad wrought	13.00 to 13.50
No. 1 railroad and machinery cast scrap	13.00 to 13.50
Steel axles	17.00 to 17.50
Iron axles	22 50 to 23.00
Carwheels	12.50 to 13.00
Railroad malleable	12.00 to 12.50
Locomotive grate bars	10.00 to 10.50
Stove plate (net ton)	9.75 to 10.00
Wrought pipe	9.50 to 10.00
Machine turnings	6.00 to 6.50
Heavy steel axle turnings	8.00 to 8.75
Clean cast borings	6.25 to 6.75
Bundled tin scrap	14.00

Boston

BOSTON, MASS., October 14, 1913.

Old Material.—The market is so weak that prices have been scaled down rather sharply, considering how low they have been for some time. Transactions are few, and actual values are difficult to determine. The quotations given below are based on prices offered by the large dealers to the producers and to the small dealers and collectors, per gross ton, carload lots, f.o.b. Boston and other New England points which take Boston rates from eastern Pennsylvania points. In comparison with Philadelphia prices the differential for freight of $2.30 a ton is included. Mill prices are approximately 50c. a ton more than dealers' prices.

Heavy melting steel	$8.75 to $9.00
Low phosphorus steel	13.75 to 14.75
Old steel axles	13.75 to 14.75
Old iron axles	21.25 to 21.75
Mixed snafting	13.25 to 13.50
No. 1 wrought and soft steel	10.50 to 10.75
Skeleton (bundled)	7.50 to 7.75
Wrought-iron pipe	8.50 to 8.75
Cotton ties (bundled)	8.50 to 8.75
No. 2 light	3.75 to 4.25
Wrought turnings	5.00 to 5.25
Cast borings	5.00 to 5.25
Machinery, cast	11.75 to 12.25
Malleable	8.00 to 8.25
Stove plate	7.75 to 8.00
Grate bars	6.75 to 7.00
Cast-iron carwheels	13.75 to 14.25

New York

NEW YORK, October 15, 1913.

Pig Iron.—The week has been the quietest in several months. Nearly all foundries have iron under contract that will run them practically to the end of the year, though there is each week some inquiry for delivery in the last quarter, in one case 1500 tons being wanted for this year. The largest pending inquiry is from a New Jersey manufacturer of furnace castings. While 1000 tons is asked for, with deliveries covering the first quarter of 1914, it is believed that as heretofore this company will make a number of purchases of that amount, making a total of 4000 to 5000 tons, as various irons are included in the mixture. Considerable shipments are being made to Sound points by Buffalo furnaces, in the effort to clean up certain contracts before the end of the navigation season. The last charters from Buffalo to New York harbor were at $1.40. Prices have shown a slight tendency to weakness in view of the halt in buying in all iron and steel lines. One eastern Pennsylvania interest has sold No. 2X foundry at $15 at furnace. Some further curtailment of furnace capacity in eastern Pennsylvania is about to be made. There is no actual buying of English iron so far as can be learned. No. 3 Cleveland iron can be laid down at Atlantic seaboard at $15.50 to $15.75, or close to a parity with the home market. It is not probable that imports will cut any figure unless there should be a further advance in the domestic market, which is not now indicated, and at the same time a decline of about 2 shillings in Middlesbrough iron. We quote Northern iron for tidewater delivery as follows: No. 1 foundry, $16 to $16.25; No. 2 X, $15.75 to $16; No. 2 plain, $15.50 to $15.75. Southern iron is quoted at $15.75 to $16.25 for No. 1 foundry and $15.25 to $15.75 for No. 2.

Finished Iron and Steel.—If there are buyers holding off for lower prices, there are few indications of the fact in the way of inquiries, definite or indefinite. The admitted needs of the railroads are, it is held, waiting the settlement of the freight rate adjudication. Those who believe that there will be a rush of buying with a break in the market are far outnumbered by those who emphasize that there is neither overproduction nor yet underproduction; that consumption has been large, that industries generally are not handicapped for the want of material, nor yet in dire need, all of which is taken to point that no remarkable change will occur before the first of the year, when it is expected the present negative influences will have vanished. In the structural field, considerable interest is shown in the Austin-Nichols wholesale grocery warehouse in Brooklyn, requiring 6000 tons, and among other projects likely to be closed early is 700 tons for the Aetna Insurance Company, Hartford. Late awards include 600 tons for a drawbridge, Boston, to the Boston Bridge Works; 300 tons for a milk station, so-called, at Lynn, Mass., to Levering & Garrigues Company; 400 tons for the Strausser warehouse, Baltimore, to Dietrich Brothers; and 400 tons for the Young Women's Hebrew Association, 450 tons for the Harlem Hospital, Lenox avenue, and 450 tons for a loft on Twenty-ninth street, all to Ravitch Brothers. New work includes 2000 tons for the Yale Club, New York. New inquiries for railroad cars continue, mostly for steel passenger equipment, and to recent lists may be added 220, including 100 coaches, for the New Haven; 85 for the Missouri Pacific; 12 for Louisville & Nashville; 10 for the Boston & Maine, and 24, electric, for the New York Central, making a total of over 1000 now in the market. The Chicago & Northwestern has placed its 2000 cars, half to the American Car & Foundry Company and half to the Western Steel Car & Foundry Company. The Great Northern has purchased 10 postal cars from Barney & Smith Company; Sulzberger & Co., 200 underframes from the Curtis Truck & Forging Company, and the Buffalo, Rochester & Pittsburgh, 3213 underframes for existing cars from the Cambria Steel Company. A little weakness, perhaps local, has been shown in steel bars, one lot of 500 tons of light angles going at the base price of 1.40c., Pittsburgh, but with the usual extra shaded somewhat. It is doubtful if the extra for twisting reinforcing bars is obtained. A drop in demand is reported in iron bars. We quote mill shipments of plain material and plates at 1.35c. to 1.40c., Pittsburgh, or 1.51c. to 1.56c., New York; steel bars 1.40c., Pittsburgh, or 1.56c., New York, and bar iron 1.35c. to 1.50c., New York. Store prices range from 1.95c. to 2.05c. for steel bars and 2c. to 2.10c. for iron bars and steel plates and shapes.

Ferroalloys.—There is no activity in the market. Sales and inquiries are few. Shipments of both ferromanganese and ferrosilicon on old contracts are good, but there are very few spot deliveries. The quotation for 80 per cent. ferromanganese remains firm at $50, Baltimore. The reduction in the duty on 50 per cent. ferrosilicon from 20 per cent. to 15 per cent. has not as yet affected the quotations, which remain at $75, Pittsburgh, for carloads; $74 for 100 tons, and $73 for 600 tons and over.

Cast-Iron Pipe.—The Warren Foundry & Machine Company was the successful bidder on 500 tons for Fall River, Mass., on which bids were opened October 8. Competition for this contract was sharp, as it has recently been on all public lettings. Atlantic City, N. J., will open bids on Thursday, October 16, for 6227 tons of 48-in., 256 tons of 30-in. and 80 tons of specials. Inquiry from private buyers is in larger volume, and some feelers are already appearing for spring delivery. No large sales to private consumers are reported. Carload lots of 6-in. are quoted at $23 to $23.50 per net ton, tidewater, New York.

Old Material.—The situation appears to be going from bad to worse. Consumers are not seeking material, and offers of concessions by dealers awaken no interest. Cancellations of contracts are being made if deliveries are not accomplished at the exact time specified, and rejections are frequent on trivial pretexts. Foundries are refusing to buy cast scrap, as they are expecting to get pig iron considerably cheaper than

prices recently ruling. Dealers' quotations are about as follows, per gross ton, New York:

Old girder and T rails for melting	$8.75 to	$9.25
Heavy melting steel scrap	8.75 to	9.25
Relaying rails	21.00 to	21.50
Rerolling rails	12.00 to	12.50
Iron car axles	22.00 to	22.50
Steel car axles	16.00 to	16.50
No. 1 railroad wrought	11.50 to	12.00
Wrought iron track scrap	10.75 to	11.25
No. 1 yard wrought, long	10.00 to	10.50
No. 1 yard wrought, short	9.50 to	10.00
Light iron	3.50 to	4.00
Cast borings	5.00 to	5.50
Wrought turnings	5.00 to	5.50
Wrought pipe	8.50 to	9.00
Carwheels	11.50 to	12.00
No. 1 heavy cast, broken up	11.00 to	11.50
Stove plate	8.50 to	9.00
Locomotive grate bars	7.50 to	8.00
Malleable cast	9.00 to	9.50

The Alfred E. Norton Company, fabricator and erector of structural steel work, 105 West Fortieth street, New York City, is going out of business, and it is understood will sell the fabricating shops at Boonton, N. J. Mr. Norton is to devote himself again to the steel erecting business.

Metal Market

NEW YORK, October 15, 1913.

The Week's Prices

Cents Per Pound for Early Delivery.

	Copper, New York.			Lead		Spelter	
Oct.	Lake.	Electrolytic.	Tin, New York.	New York.	St. Louis.	New York.	St. Louis.
9	16.75	16.50	40.60	4.50	4.35	5.35	5.20
10	16.62½	16.37½	40.25	4.50	4.35	5.35	5.20
11	16.62½	16.37½	....	4.50	4.35	5.35	5.20
14	16.62½	16.37½	40.30	4.47½	4.32½	5.35	5.20
15	16.62½	16.37½	40.35	4.45	4.30	5.35	5.20

Offerings of copper by second hands are lower, but there is practically no business. Tin is dull and quotations are lower. Lead has declined, but buyers have not come forward. Spelter is off a few points and is dull. Antimony, responding to the new tariff, is lower.

New York

Copper.—In all directions the one thing heard about copper is that there is practically no business. The large agencies are understood to be holding to their prices of 16.87½c., delivered 30 days, for electrolytic, and 17c. to 17.12½c. for Lake, but these prices are purely nominal. So far as there is any market it is being made by the offerings by second hands who have quoted down to 16.62½c. cash for Lake and 16.37½c. cash for prompt delivery electrolytic. There have been reported offerings of electrolytic at 16.12½c. and 16.25c., cash, for November and December deliveries. The market in every way indicates that consumers are awaiting developments. While the statistical position is stronger, consumption is easing off, as was shown by the September report of the Copper Producers' Association. It is still, however, going on at a good rate. Quotations in London to-day were £71 10s. for both spot and futures. Exports this month total 12,321 tons.

Pig Tin.—The market has been dull continuously and yesterday there was so little doing that it was difficult to ascertain the price. Buying is of a hand-to-mouth character and not sufficient to be of any real importance in its bearing on the market. As the trade reads the indications, deliveries into consumption from this time on will be smaller until consumptive conditions have become more settled. The tin plate industry in particular is expected to absorb less of the metal. Quotations in New York to-day are 40.35c. In London £184 15s. is quoted for both spot and futures. Arrivals this month amount to 1920 tons and there is afloat 2045 tons.

Lead.—Late on October 8 the American Smelting & Refining Company reduced its prices to 4.50c., New York, and 4.35c., St. Louis. These figures held for the remainder of the week, when outsiders met the cut and 4.47½c., New York, and 4.32½c., St. Louis, was quoted by them. The independent producers are eager to get business and yesterday prices were shaded to 4.45c., New York, and 4.30c., St. Louis. It was believed by many that the market would become steady at 4.50c., New York, and that it did not do so was a cause of disappointment. Now that 4.45c., New York, is quoted it is considered almost a surety that prices will go still lower unless business picks up very soon. It is quiet at present.

Spelter.—Demand has been lacking and the result has been declining prices until 5.35c., New York, and 5.20c., St. Louis, are quoted, with weakness still prevailing.

Antimony.—As was anticipated, the market has been quiet because of the large quantities of the metal in bond which have been drawn upon more or less heavily since the enactment of the new tariff. Prices are lower at 7.12½c. to 7.25c. for Hallett's, 7.50c. to 7.62½c. for Cookson's and 6.37½c. to 6.75c. for Chinese and Hungarian grades.

Old Metals.—The market is dull and dealers' selling prices have been reduced, being now as follows:

	Cents per lb.
Copper, heavy and crucible	15.50 to 15.75
Copper, heavy and wire	15.00 to 15.25
Copper, light and bottoms	13.25 to 13.50
Brass, heavy	9.75 to 10.00
Brass, light	8.25 to 8.50
Heavy machine composition	13.50 to 13.75
Clean brass turnings	9.00 to 9.25
Composition turnings	11.75 to 12.25
Lead, heavy	4.25
Lead, tea	4.00
Zinc scrap	4.37½

Chicago

OCTOBER 13.—The new tariff has affected prices on antimony, a marked reduction being made in all grades. General business in metals is of fair volume, consisting of numerous small orders, little tendency being shown to contract for future requirements. The market for old metals is very quiet and the trend is toward lower prices. Transactions are of a light nature and in many instances at concessions. We quote as follows: Casting copper, 16.75c.; Lake copper, 17c. to 17.25c., for prompt shipment; small lots ¼c. to ⅛c. higher; pig tin, carloads, 41.50c.; small lots, 43.50c.; lead, desilverized, 4.50c. to 4.55c. and corroding, 4.75c. to 4.80c. for 50-ton lots; in carloads, 2½c. per 100 lb. higher; spelter, 5.45c. to 5.50c.; Cookson's anitmony, 9.50c.; other grades, 8c.; sheet zinc, $7.75, f.o.b. La Salle or Peru, Ill., less 8 per cent. discount in carloads of 600 lb., sacks. On old metals we quote buying prices for less than carload lots as follows: Copper wire, crucible shapes, 14c.; copper bottoms, 12.50c.; copper clips, 13.25c.; red brass, 12.50c.; yellow brass, 9c.; lead pipe, 3.87½c.; zinc, 3.90c.; pewter, No. 1, 26c.; tin foil, 32.50c.; block tin pipe, 33c.

St. Louis

OCTOBER 13.—Prices are again lower, with lead at 4.35c. to 4.40c.; spelter, 5.25c. to 5.30c.; Lake copper, 17.10c. to 17.35c.; electrolytic copper, 16.85c. to 17.22½c.; tin, 40.35c. to 40.75c.; Cookson's antimony, 8.65c. The Joplin ore market was depressed, and the basis range on 60 per cent. zinc blende was $40 to $44 per ton, with the top settlement at $47. Calamine ranged from $19 to $21, with the top settlement at $25. Lead ore continued weak at $54 for 80 per cent. On miscellaneous scrap metals we quote as follows: Light brass, 5.50c.; heavy brass and light copper, 10c.; heavy copper and copper wire, 11.50c.; zinc, 2.75c.; tea lead, 2.75c.; pewter, 24c.; tinfoil, 30c.; lead, 3c.

Iron and Industrial Stocks

NEW YORK, October 15, 1913.

Security prices have, with few exceptions, sought lower levels. The fear that tariff reductions might unfavorably affect earnings was the reason assigned for the decline in the prices of industrial stocks, while tightness in the money market and unsatisfactory conditions abroad were influences which depressed railroad securities. The range of prices on active iron and industrial stocks from Wednesday or last week to Tuesday of this week was as follows:

Am. Can, com.	30⅜	34¾	Pressed Steel, pref.	98	
Am. Can, pref.	92⅛	95⅛	Railway Spring, com	24	24½
Am. Car & Fdy., com.	42	43⅜	Railway Spring, pref.	94	
Am. Car & Fdy., pref.	114	115	Republic, com.	18½	20
Am. Loco., com.	30	30¼	Republic, pref.	78	79⅞
Am. Loco., pref.	94	94½	Rumely Co., com.		20½
Bald. Loco., com.		42⅛	Rumely Co., pref.	48⅛	49⅞
Beth. Steel, com.	28½	31¼	Sloss, com.		29
Beth. Steel, pref.	69⅞	70	Pipe, pref.		89
Case (J. I.), pref.	95½	95¼	U. S. Steel, com.	53¾	56⅞
Colorado Fuel	27½	28¾	U. S. Steel, pref.	104½	105¾
General Electric	139⅞	144	Va. I. C. & Coke		43
Gr. N. Ore Cert.	30⅞	32½	Westinghouse Elec.	65	68¼
Int. Harv., com.	104¾	105	Am. Ship, com.	33⅞	34
Int. Harv., Corp.	104¾	104¾	Chic. Pneu. Tool	53	53¾
Int. Harv. Corp. pref.	114¼	114½	Cambria Steel	48½	49⅜
Int. Pump, com.		7	Lake Sup. Corp.	23½	24¼
Nat. En. & St., com.	10⅜	11½	Pa. Steel, pref.		68
Nat. En. & St., pref.	79	79¼	Crucible Steel, com.	15½	15⅝
Pittsburgh Steel		93	Crucible Steel, pref.	86½	87¼
Pressed Steel, com.	24	25			

Dividend Declared

The American Shipbuilding Company, regular quarterly, 1¾ per cent. on the preferred stock, payable October 15.

American Shipbuilding Company's Year

At the annual meeting of the American Shipbuilding Company, held October 8, the report for the year ended June 30, 1913, was presented. The income account compares as follows:

	1913	1912
Net earnings	$849,874	$802,528
Depreciation, maintenance, etc.	243,400	221,828
Balance	$606,474	$580,699
Preferred dividends	553,000	553,000
Surplus	$53,474	$27,699

The general balance sheet as of June 30, 1913, compares as follows:

Assets

	1913	1912
Plant and property	$18,965,312	$18,916,436
Material on hand	611,175	616,167
Stocks and bonds	2,377,214	1,932,974
Uncompleted contracts	838,281	642,230
Cash	957,282	1,119,530
Accounts and notes receivable	2,325,885	2,809,060
Total	$26,075,149	$26,036,398

Liabilities

Preferred stock	$7,900,000	$7,900,000
Common stock	7,600,000	7,600,000
Accounts and notes payable	3,226,065	3,060,273
Reserve fund	787,718	968,232
Surplus	6,561,367	6,507,892
Total	$26,075,149	$26,036,398

In his accompanying remarks to stockholders President J. C. Wallace said: "Marine affairs on the Great Lakes, for the past fiscal year, have been relatively poor. Low rates have prevailed, and in consequence the company has not had a very favorable year. The company has built and completed 14 vessels, and has now 12 under construction. The prospects for the coming year are not good for new construction, as it has been demonstrated that with the increased depth of water and the rapidity that has been attained in loading and unloading, through the installation of new and modern plants at the ports, the present tonnage on the Lakes is ample. It is believed a large amount of reconstruction work will have to be done during the coming winter on the smaller and older vessels."

Several changes were made in the directorate. A. L. Baker, F. A. Brown, H. A. Christy, Starr J. Murphy and A. A. Sprague were elected to the board, succeeding R. B. Wallace, H. M. Hanna, P. H. McMillan, A. M. Joys and F. T. Gates. The directors re-elected the officers, with the exception of W. L. Brown, chairman of the board, who declined to accept another term. For the present this office will remain vacant.

An Eastern financial paper publishes the following important market information, as coming from its Pittsburgh representative: "Local steel and iron companies deny any change in selling prices as result of the tariff. Quotations are given as follows: Carnegie Steel Company, plate and shapes, $1.45 per base box, Pittsburgh; steel bars, $1.40 per base box, Pittsburgh. American Sheet & Tin Plate Company, tinplate, $3.60 per base box, Pittsburgh; steel sheets, $2.05 to $2.15 per base box, Pittsburgh. American Steel & Wire Company refused to give quotations on either wire or nails. Jones & Laughlin also refused to give quotations, but say they are selling at market prices."

The Government statistics of cereal crops for this year, issued October 9, indicate the production of the principal grains as follows: Corn, 2,373,000,000 bushels, which is 752,000,000 bushels below last year's record crop, but about 22,000,000 bushels higher than the estimate made September 1; winter and spring wheat combined, 753,233,000 bushels, or 22,966,000 bushels more than last year's crop; oats, 1,122,139,000 bushels, or 296,198,000 bushels less than last year's crop.

Sale of the assets of Milliken Bros., Inc., Staten Island, N. Y., advertised for October 10, has been postponed to November 11. This was done to give the bondholders additional time to act upon the submitted reorganization plan.

The cotter pin business of Andrew C. Campbell, Inc., Waterbury, Conn., has been sold to the American Chain Company, Inc., Bridgeport, Conn.

Obituary

Henry B. Lupton

Henry Buck Lupton, vice-president of the Oliver Iron & Steel Company, Pittsburgh, died October 7 at his home in that city, aged 64 years. He was born in Cincinnati. Immediately after leaving school he entered the employ of W. A. McCall, a hardware merchant of Cincinnati, with

HENRY B. LUPTON.

whom he remained several years. He then engaged in business for himself as a manufacturers' agent, representing among others the Oliver Wire Company of Pittsburgh, and in 1896 went to Pittsburgh as its secretary. In 1899, when the Oliver Wire Company was taken over by the American Steel & Wire Company, he entered the sales department in the New York office. In 1900 he returned to Pittsburgh to become vice-president of the Oliver Iron & Steel Company. He leaves a widow, a daughter, Mrs. James Scott, and a son, Dilworth R. Lupton.

ALEX Z. NEWLIN, mechanical engineer of the Kewanee works of the National Tube Company, died of pneumonia October 7 at his home in Kewanee, Ill., aged 37 years. He was born in McKeesport, Pa., graduating from the public high school in 1895. After teaching school for three years he entered the service of the National Tube Company in its enginering department at McKeesport. In 1901 he was transferred to the company's general engineering department, Frick Building, Pittsburgh, and in October, 1908, was made mechanical engineer of the Kewanee works. He was an exceptionally bright and promising young man, capable, industrious and ambitious. He leaves a widow and two children.

The body of DR. RUDOLPH DIESEL, who disappeared from a steamship crossing the English Channel, September 29, is stated by a dispatch from Amsterdam to have been washed ashore on Walcheren Island, and to have been identified by his son.

HENRY NORRIS DALTON, president Henry N. Dalton & Sons Company, Oakland, Cal., died at his home in that city October 5, aged 84 years. He was a native of New York City, and had been in the foundry business in Oakland for 36 years.

MICHAEL A. SEEBOTH, for 11 years secretary of the William H. Pipkorn Company, founders' supplies, 712 Park street, Milwaukee, Wis., died last week after a long illness, aged 39 years.

The Pacific Iron & Steel Company has announced plans for the construction of a pig-iron plant at Port Townsend, Wash., with a daily capacity of 25 tons. It is said that an electric furnace will be used.

Personal

The Taylor-Wharton Iron & Steel Company, High Bridge, N. J., announces that A. E. Borie has resigned as vice-president and has been elected chairman of the board of directors and that L. W. Jones and W. L. Wright have been elected vice-presidents. Mr. Borie has also been elected chairman of the board of directors of the American Road Machinery Company.

Arthur V. Davis, president Aluminum Company of America, Pittsburgh, has sailed for Europe.

George L. Claypool, for some years assistant general manager of sales of the Republic Iron & Steel Company, resident in Pittsburgh, has resigned, effective October 15, and will be connected with the firm of Banning, Cooper & Co., Oliver Building, Pittsburgh, dealers in coke, pig iron and steel. Mr. Claypool was originally connected with the Mahoning Valley Iron Company at Youngstown, Ohio, and after it was taken over by the Republic Iron & Steel Company he was transferred to its sales department at Cleveland. In 1903 he went to Pittsburgh as manager of sales in that district and on October 1, 1909, was appointed assistant general manager of sales. W. W. Hall, now manager of sales in the Pittsburgh district, will assume full charge of the Pittsburgh office.

John M. Studebaker, South Bend, Ind., celebrated his eightieth birthday October 10. He is chairman of the Studebaker Corporation and is the only one of the founders of the noted vehicle company now living. He enjoys good health and is still in the harness, reporting daily at the factory soon after 7 a.m., and remaining, like his employees, until 6 p.m. He stood at the office door on his birthday and received the congratulations of the 3000 employees, as he shook hands with all. They gave him a gold loving cup.

A. O. Krieger, for years publicity manager of the Busoh-Sulzer Bros. Diesel Engine Company, has taken charge of the gasoline engine sales of the Whitman Agricultural Company, St. Louis, Mo.

Samuel G. Goodrich, who in the past has represented several machine tool houses as a salesman, has taken an office at 30 Church street, New York, as a direct representative of manufacturers of machinery and specialties. His new line will include the Beche pneumatic forging hammer made by the Nazel Engineering & Machine Works, Philadelphia, Pa.

W. L. Kluttz has resigned as general superintendent of the furnaces of the Republic Iron & Steel Company at Thomas, Ala., and on November 1 will succeed J. W. Shook as vice-president and general manager of the Central Iron & Coal Company, Tuscaloosa, Ala.

George S. Griscom, Jr., formerly connected with the iron trade in Chicago and Pittsburgh, is now located in Parliament Mansions, Victoria street, Westminster, London, S. W., England, representing the Riter-Conley Mfg. Company, Cummings Structural Concrete Company and Wemlinger Steel Piling Company.

Joseph A. Anglada, consulting engineer, 1790 Broadway, New York, has sold his interests in the Anglada Company, Detroit, Mich., manufacturer of demountable rims and automobile accessories, and has resigned the presidency of that company, in order to become interested in a company which will manufacture a small car of his design.

C. C. Whittier has been made treasurer and general manager of Robert W. Hunt & Co., Ltd., with headquarters at 905 McGill Building, Montreal. He has been residing in Winnipeg, in charge of the company's business in that district, but has moved to Montreal. T. C. Irving, Jr., has been re-elected vice-president of the company and will remain in charge of the business in Toronto and the surrounding district.

R. N. Dickman, mining engineer, has become associated with Robert W. Hunt & Co. in the United States and with Robert W. Hunt & Co., Ltd., in Canada. His headquarters will be 2200 Insurance Exchange, Chicago. He is now engaged upon the examination of gypsum and coal properties in Western Canada.

G. Fred Collins, who for years has been engaged in the railroad supply business, has become associated with the Protectus Paint Company in its selling department. His present address is North American Building, Philadelphia, Pa. It is expected that he will later on take charge of a branch office to be opened in Pittsburgh.

Col. H. P. Bope, vice-president Carnegie Steel Company, Pittsburgh, who was operated upon for appendicitis in New York in September, has recovered and is again attending to business.

J. L. W. Birkinbine, manager of the Benson Mines, St. Lawrence County, N. Y., is in Cuba.

Earnest W. Saunders, Cleveland, Ohio, sales manager of the Carbon Steel Company, with offices in the Williamson Building, has been made district sales manager of that company, his territory covering Ohio, Michigan and Indiana. A sales office has been opened in the Ford Building, Detroit, Mich.

J. D. Waddell, general manager of sales of the Brier Hill Steel Company, Youngstown, Ohio, announces the appointment as assistant general manager of sales of P. H. Hubbard, who will have charge of sales of all sheet mill products, including the company's black and galvanized sheets, formed roofing products, roofing specialties, etc. Mr. Waddell will devote his time to the sale of all the products to be manufactured by the company's new open-hearth steel works, comprising sheet and tin bars, billets and slabs, on which December and later deliveries are now being quoted.

The Philadelphia Foundry Foremen's Association held its regular monthly meeting on the evening of October 8. Nominations for officers to be elected in November were made as follows: President, Clarence R. Brown; vice-president, John J. McCoy and Clarke Moore; secretary-treasurer, H. A. White; trustees to serve three years, Thomas Connoly and John Alexander. W. W. Parry was appointed a delegate to the convention of the Associated Foundry Foremen at Chicago. Frank Fennelle and Harry Kramer, of the William Adams Foundry Company, were elected members. The paper for the evening's discussion was on "The Evans High Pressure Sand Blast System," manufactured by the Carter Metals Cleaning Company, Philadelphia. It was received with a great deal of interest.

The Cincinnati Engineers' Club and the Cincinnati Chapter of American Architects, numbering approximately 200, were guests of the American Rolling Mill Company, Middletown, Ohio, on October 8. The party went from Cincinnati on a special train, in charge of G. F. Ahlbrandt, assistant sales manager. The old Central works was first visited, where a cordial address of welcome was made by R. C. Phillips, secretary of the company. He was followed by G. H. Charls, sales manager, who talked on "Quality." The guests were divided into groups of 15, and a guide was placed in charge of each. After inspecting the research laboratory and the sheet metal specialty plant, the new East Side works was visited, where the pouring of a heat was witnessed.

The Baldwin Locomotive Works, Philadelphia, Pa., has issued a booklet announcing the completion of its 40,000th locomotive. The company built its first engine in 1832; its 1000th in 1861, and in 1880 its 5000th appeared. The 10,000th was built in 1889 and the 20,000th in 1902. Five years more, 1907, saw the completion of the 30,000th. The 40,000th completed this year is a fast passenger Pacific type for the Pennsylvania Railroad having cylinders 26 in. in diameter by 26-in. stroke, 80-in. driving wheels, 4525 sq. ft. of heating surface and weighs 189,500 lb.

The Gamboa dike in the Panama Canal was blown up October 10 by President Wilson, who touched a button in Washington, 4000 miles away, and the canal is now a continuous waterway from the Atlantic to the Pacific.

The American Steel Foundries, Chicago, has removed its general offices from the Commercial National Bank Building to the eleventh and twelfth floors of the McCormick Building, Chicago.

At a recent stockholders' meeting of the American Rolling Mill Company, Middletown, Ohio, it was voted to increase the capital stock from $6,000,000 to $8,800,000.

Pittsburgh and Valleys Business Notes

At the annual meeting of stockholders of the Westinghouse Air Brake Company, recently held at Wilmerding, Pa., George Westinghouse was re-elected president. The directors are as follows: Horace E. Andrews, Cyrus S. Gray, E. M. Herr, Charles McKnight, John F. Miller, H. G. Prout, Morris S. Rosenwald, W. D. Uptegraff, George Westinghouse and H. H. Westinghouse. The annual report of the company was issued several weeks ago, and was very satisfactory to the stockholders.

The Epping-Carpenter Company, Pittsburgh, is making some additions to its foundry department, including a new building, 60 x 125 ft., to be equipped with a 20-ton electric traveling crane and a one-ton wall crane.

The prices of the Pittsburgh Coal Company, the leading miner and shipper of bituminous coal in the Pittsburgh district, for delivery up to April 1, 1914, are $1.40 for mine-run, $1.50 for ¾ in. and $1.65 for 1¼ in. domestic. The company has no slack or nut to spare, being pressed for deliveries on its contracts. Some large outside operators are asking 10c. above these prices, and claim to be effecting some sales. Slack is generally quotable at $1.10 to $1.25, depending on tonnage and location. Prices here quoted are per ton of 2000 lb. at mine, Pittsburgh district.

At a meeting of the board of directors of the Pittsburgh Iron & Steel Foundries Company, Midland, Pa., Weaver H. Rogers was elected vice-president and general manager and has assumed the active management of the company. In order to take care of the large increase in the demand for Adamite rolls and castings manufactured by this company, in addition to the new lines now under development, it is contracting for two new electric traveling cranes of large capacity, a new heating furnace and other equipment. This will give the company a capacity more nearly equal to other large foundries in the Pittsburgh district, the present floor space being approximately 125,000 sq. ft.

The Penn Bridge Company, Beaver Falls, Pa., has received a contract from the United States Government for fabricating 2250 tons of lock gates to be used on the locks improving the waterway connecting Puget Sound with Lake Union and Lake Washington, near Seattle, Wash., the contract price being $309,691.

The Youngstown Sheet & Tube Company, Youngstown, Ohio, has made public its plan for selling $500,000 of its preferred stock to employees. The plan provides that employees who have been with the company since 1905 or earlier will be given an opportunity to purchase stock at par, and $5 a share will be added to the price each subsequent year, making employees coming with the company in 1913 pay $140 for a share, which latter figure is about $25 a share under the present market price. The company reserves the right to say whom of its employees will be allowed to buy the stock.

The Ohio Iron & Steel Company, operating Mary furnace at Lowellville, Ohio, is building a two-story brick club house for its employees. It will be fully equipped for the pleasure of the workmen.

The McKinney Mfg. Company, North Side, Pittsburgh, manufacturer of hinges, barn door hangers and other specialties, has bought property adjacent to its plant on which it will build a brick warehouse, 105 x 130 ft.

Practically all the stock of the Monongahela Natural Gas Company, Pittsburgh, will be taken over by the Fairmont & Grafton Gas Company, which thereby acquires the use of the Monongahela Company's large pipe line from the West Virginia fields to Pittsburgh, having a carrying capacity of 30,000,000 cu. ft. of gas a day. The deal involves the issue by the Fairmont & Grafton Gas Company of $1,500,000 of collateral trust bonds, payable in equal installments over a period of 10 years. The Monongahela Company has a large amount of productive natural gas territory, having over 125,000 acres under lease, principally in Greene County, Pa. It owns 169 natural gas wells and 11 producing oil wells. The name of the Fairmont & Grafton Gas Company will probably be changed to the Pittsburgh & West Virginia Gas Company.

The Pennsylvania Lines West will erect a steel and concrete freight station, 40 x 300 ft., at Erie, Pa. Cranes and freight handling machinery will be needed.

The Thomas Carlin's Sons Company, Pittsburgh, has recently shipped to the Westinghouse Electric & Mfg. Company a 6-ft. stationary pan for grinding brass ashes in the brass foundry and to the Coatesville Scrap Iron & Steel Company, Coatesville, Pa., a No. 1 belt-driven shear, having a capacity to cut 6 x 6 in. An order has been booked from Worth Brothers Company, Coatesville, Pa., for a 9-ft. dry pan; United Steel Company, Canton, Ohio, for a No. 3 shear; National Rolling Mill Company, Vincennes, Ind., for a No. 61 shear.

The National Drawn Steel Company, East Liverpool, Ohio, has taken over the business of the Kidd Bros. & Burgher Steel Wire Company and is operating the plant at Aliquippa, Pa., until its new plant at East Liverpool is completed, which will be on or before December 1. The change is really only one in name, as the men and management are the same that have operated the Aliquippa plant for many years. The entire organization will be taken away to the new plant at East Liverpool when the removal is made.

Good progress is being made in the construction of an addition, 50 x 125 ft., of brick with steel frame, being built to the plant of the Union Drawn Steel Company on Fifteenth street, Beaver Falls, Pa. It will contain new furnace and pickling rooms. At the plant at the lower end of Beaver Falls, the company is equipping the second battery of boilers with automatic stokers.

The Central Railways Signal Company, Versailles, a suburb of McKeesport, Pa., manufacturer of torpedoes and other railroad fuses, is preparing to build an addition to its plant, 30 x 120 ft. Frank Dutcher is the manager.

Wire Ropes for Panama Canal

The approach of the time when the largest vessels will be passing through the Panama Canal is indicated by tests recently made at the works of the John A. Roebling's Sons Company at Trenton, N. J., of the wire ropes to be used as towing lines at the great locks at Gatun and Miraflores. Forty wire ropes, each 400 ft. long, have so far been made by the Roeblings for this purpose. Each rope has 6 strands, twisted around a hemp center. The ropes are 1 in. in diameter and have a 4-ft. loop at one end.

The specifications for the ropes called for a tensile strength of 37 tons each. To obtain this requires a tensile strength in the wire of 260,000 lb. per sq. in. Pieces cut from ends of the ropes when broken in the testing machine showed the ropes to have strengths ranging from 12 to 15 per cent. in excess of that called for by the specifications.

In towing boats through the locks four electric locomotives will be used for each vessel at each lock. Two of these locomotives will be connected by the wire ropes to the bow and two to the stern.

Armor Plate Contract Goes to Midvale

The Midvale Steel Company on Tuesday, October 14, was awarded the entire contract for the armor required for the new dreadnought, No. 39, with bids just $14 per ton less for each of the three classes of plate used than the previous identical bids of the Midvale, the Carnegie and the Bethlehem companies, which Secretary Daniels rejected. The Government saves $111,875. While the award is made to the Midvale Company, Secretary Daniels agreed to permit it to sublet any part of the contract to the other companies if it cannot manufacture the armor in time for the completion of the ship at the time fixed.

The revised bids showed that Midvale had reduced its first figures $14 per ton, Bethlehem $10 and Carnegie $7. Secretary Daniels is reported to be more than ever dissatisfied with the attitude of the three companies and to be confirmed in his purpose to ask Congress to make an appropriation for the establishment of a Government armor plate factory.

A Gary Record in Billets.—A record tonnage in the rolling of billets was attained on the billet mill of the Gary works of the Illinois Steel Company during September, the total for the month aggregating 78,000 tons. The largest rolling for any one day of 24 hours was 4679 tons and for the day turn of that period 2542 tons. This record surpasses all previous performances for a like period.

Foundry Economies Forced by Low Tariff

A Keynote of the Opening Session of the Chicago Convention—A. F. A. Membership at High Point—A Remarkable Exposition

(*Special Telegram*)

CHICAGO, ILL., October 14, 1913.—All that has been anticipated for the Chicago gathering of foundrymen this week, both in numbers and interest, gives promise of being realized. The prominence and variety of foundry operations in this city, its accessible location and the character of the papers to be presented at the several meetings, have brought together foundrymen from the most remote parts of the United States and Canada. The exhibition of foundry equipment, as indicated in the synopsis of exhibits given in *The Iron Age* of last week, is larger and more varied than has been attempted before, and its effectiveness is enhanced by the favorable display conditions under which it is presented. On this the opening day of the conventions an attendance of nearly 1000 is estimated.

The convention sessions opened at 10 a. m. with a joint meeting of the American Foundrymen's Association and the American Institute of Metals, with H. D. Miles, Buffalo Foundry & Machine Company, Buffalo, president of the former association, in the chair. He introduced Charles A. Plamondon, of Chicago, chairman of the local convention committee, who presided during the greater part of the session. In the absence of Mayor Carter Harrison, William H. Sexton, the corporation counsel, extended a welcome in behalf of the city. An address of welcome in behalf of the business interests of Chicago was made by E. C. Ferguson, of the Chicago Association of Commerce. Chairman Plamondon extended thanks to the various committees for their work in arranging the convention details and brief remarks were made by O. J. Abell, chairman of the Publicity Committee. President Miles again took the chair and called upon Alfred E. Howell, Phillips & Buttorff Mfg. Company, Nashville, Tenn., vice-president, who responded to the addresses of welcome made by the Chicago speakers.

Recommendations by the President

President Miles in his annual address congratulated the association on its strength and the excellent results it has accomplished. He said that it is in proportion to the interest created that membership increases and funds are supplied for carrying on the work, and that it is important that the practice of changing the meeting place yearly should be continued. Supplementing this, however, should be frequent campaigns for new members. The officers carried on such a campaign this year with very satisfactory results, the membership having increased over 20 per cent. and being larger now than ever. He said that one of the difficulties experienced is the lack of proper interest by some of the members in the work done and the help offered by the association. Managers of plants are frequently too busy with their own affairs to give time to study the lessons taught by the association. He suggested as a remedy that such managers designate some one person among their employees best qualified to look after association matters and attend conventions, and from knowledge thus obtained report on betterments which may advantageously be adopted. He recommended that more general interest be taken in the discussion of papers read and that more members take part in these discussions. Another recommendation was that a committee on standard foundry costs be provided for, this committee to have authority to employ an expert to assist it; and after a proper system is prepared, every effort should be made for its general adoption by foundries. He said that the radical reduction in duties under the new tariff will greatly alter conditions in some lines of trade, and the association must do its share in suggesting ways and means of increasing output and reducing cost. In conclusion he expressed his appreciation of the splendid work done by Dr. Moldenke, secretary and treasurer.

Report of Secretary-Treasurer

Dr. Richard Moldenke presented the following report for the year as secretary and treasurer:

The last few years have been notable in the foundry world for the attention given to cupola practice. The work done by our association in this direction and the stimulus given to individual investigators here and abroad have been such that to-day we may truly say that melting iron in the cupola has been at last placed upon a scientific basic. The idea that every cupola has its mysterious ailments and must be humored and prescribed for specially is now exploded, and the foundryman knows that whether his cupola be big or little, whether run continuously or for a few hours at a time only, certain definite relations between volume of air supply, position of the fuel bed, and maintenance of melting at the zone of highest efficiency and temperature through small and properly distributed charges, are requisite in order to avoid all those troubles which castings are heir to, even when starting with the highest grade of metal. The office of the association has been deluged with letters asking advice on every phase of the melting problem, and the discussion has been taken up abroad for very serious study, as is evinced by the English, German and French technical press. He may therefore consider the year just past an epoch-making one so far as the metallurgy of the foundry is concerned.

ECONOMIC PROBLEMS OF THE FOUNDRY

Two other matters stand out prominently: First, the unusual demand for accident statistics, particularly the investigation made by our association several years ago, the reports of which were speedily exhausted; second, the general feeling that standard cost accounting is highly desirable. The standard system for foundry costs prepared for our association by its committee of cost experts and efficiency engineers, is being revised and elaborated so that it may be more useful to the individual members. This report was not quite completed in time for the convention, but will be distributed later.

With the radical change in the tariff in effect now and the general feeling of uncertainty prevailing, it is quite patent to the thoughtful observer—particularly if he knows anything of the economies practised in those countries which are certain to benefit by the change in policy—that we must prepare to use the knife on our cost items where heretofore we have been rather easy going. This country does not realize how wastefully everything has been carried on, and it needed the jar of radical action to bring this home to us. It is to be hoped that we will not go efficiency-mad as a consequence; but rather that we will study human nature, select men for their best work, use only quality factors in the make-up of our product, and see that the pound of iron goes farther than ever before.

INTERNATIONAL RECIPROCITY IN PLANT VISITATION

In the chase after commercial supremacy, the nations of the earth often sin grievously. We in America have our share to explain also. We have, however, a fairly good reputation for liberality in showing our establishments. This is not the case in so great a measure in other countries; and as we are consequently at some disadvantage in the race, occasion was taken to enter a rather energetic protest within the year, when one of our valued members was excluded from establishments whose representatives had been liberally treated here. A circular letter was addressed to all the interested societies of the country; much correspondence resulted, and an almost general agreement was reached looking toward liberality in showing our establishments only when reciprocal courtesy is promised. Since that time no one is given any introduction from our office to the membership until his promise to reciprocate by opening his own establishment has been obtained. Your secretary has been bitterly assailed here and abroad as a consequence, but calm reflection will show that the man who comes to learn from us with the deliberate determination to keep his own knowledge secret may be very "smart," but is nothing other than an industrial pirate, to give it a mild appellation.

LITERARY OUTPUT BECOMES A PROBLEM

A situation that is becoming rather manifest in the foundry world of late requires attention if the good work of this association is to continue. Editors of the great trade journals have noted the same thing. It is no longer possible to obtain a wealth of papers and discussions. The foundry as a subject—limited in a manner, anyhow—is becoming too well threshed out; and while our more recent papers are not as crude as many examples of former times, nevertheless there are no more startling advances to herald or subjects to dig into readily.

It is, therefore, absolutely necessary to follow the lead of our large engineering and industrial associations, in creating efficient and representative commitees on securing papers. Not only has the change from the regular spring convention to the fall proved most disastrous in this direction, but the burden of gathering this material has become too heavy for your secretary and the few fellow officers who aid him in this work. When nearly three-quarters of the letters inviting cooperation from men able to write papers are not even given the attention of a reply, it is no longer a pleasure to try to provide a programme of wide range and good value. It is to be hoped, therefore, that willing hands will be found to help the good work along.

Attention is called to the uniformly kind reception accorded the annual volume of our Transactions. This notable book of nearly 900 pages seems to have greatly pleased our membership, judging from the numerous appreciative letters received. Since the expenditures of the association for its publications, inclusive of the cost of mailing to the members, amounts to about five sevenths of the total income, it will be seen that very good value is given those who become members. It is a question whether any other association of the size and importance of ours runs its affairs as cheaply as we do, and returns so much to its members in the way of publications.

It may be stated here that the call for back numbers has been such that we cannot supply very much more than the last two volumes of our Transactions, nearly everything else being out of print.

MEMBERSHIP AND FINANCE

Attention is called to the extension of the periodical issue of the membership list. In addition to such information of interest to the older members as the convention places, former officers, etc., there is now given a geographical distribution of the members as well as the alphabetical list. Those who are interested in building up the association can now see at a glance how the several foundry centres are represented, and it is hoped will help to interest others sufficiently to join with us. It is a matter of congratulation that of the original charter members some 60 are still with us.

Thanks to the energetic work of our president, Mr. Miles, as also of our vice-presidents, a large number of new members have been obtained, not only filling up the depletion in the ranks due to defections, but so augmenting them that to-day we have 729 members. We therefore have about 10 per cent. of the total foundries of the country, instead of 90 per cent., as it should be. Only those who know how difficult it is to get men to help create instead of reaping without sowing will realize that 10 per cent. is a very fine showing.

The finances of the association are in good shape. The following are the items of income and expenditure:

Fiscal year July, 1912, to July, 1913.

Balance	$368.56	
Income	6,533.74	
		$6,902.30
Expenditures:		
Transactions	$4,361.16	
Salaries	1,200.00	
Printing	122.82	
Postage	688.00	
Convention expense	436.09	
Sundries	3.40	
		$6,811.47
Balance		$90.83

The books have been audited by an expert accountant and turned over to your committee on audit.

In conclusion your secretary wishes to thank the members for their good will and assistance. This has enabled him to complete thirteen years of continuous service in happiness and contentment. That the association may grow and continue its good work for the betterment of the industry is his wish.

Dr. Moldenke in presenting his report said that he was particularly gratified to read it at a Chicago convention since it was 13 years ago in Chicago that he was elected secretary of the association.

The presentation of the report of L. W. Olson, president of the American Institute of Metals was deferred, as Mr. Olson was unable to arrive in time for the opening session. W. M. Corse, of the Lumen Bearing Company, Buffalo, secretary and treasurer of the institute, presented his report, which stated that there had been a slight decrease in membership during the year. The most important undertaking of the year has been the co-operative work in connection with the Bureau of Standards and the Bureau of Mines at Washington.

The report of the American Foundrymen's Association Committee on Industrial Education was presented by the chairman, P. Kreuzpointner, Altoona, Pa.

The Training of Apprentices

In the joint afternoon session, President L. W. Olson, of the American Institute of Metals, presided. In a most interesting manner M. W. Alexander described the system for training apprentices now being conducted by the General Electric Company at Lynn, Mass. Mr. Alexander pointed out the serious lack of trained employees and how far the present-day manufacturer has departed from the ancient guild system. The manufacturer was prone to turn his responsibility over to the trade school when it began to attempt instruction in the trades. Public schools have proved themselves inadequate because of their failure to follow changing industrial conditions and to bring into the class room the finger knowledge which the shop alone can afford. The General Electric system for teaching the various mechanical trades to boys over 16 years was inaugurated in 1902. At this time the training department of the machine shop apprentices alone occupies a floor space 80 x 400 ft. The instruction given during these apprenticeships is founded upon two ideas: a careful supervision and knowledge of each apprentice and the application of the father and son relationship between the instructor and the pupil. Mr. Alexander's talk was accompanied by a series of lantern slides illustrating the work being done as well as the psychology of the methods employed.

In the discussion which followed the efforts that are being made to improve the training for foundry work and to increase the number of apprentices to learn this trade were related. The foundry, perhaps more than any other branch of the industry, is seriously in need of such training for the development of new sources of skilled labor.

This talk was followed by the paper: "How to Make a Time Study," read by C. E. Knoeppel, New York City, the general points of which are printed on pages 854 and 855 of this issue.

Next Year's Meeting

The officers of the American Foundrymen's Association and of the American Institute of Metals have held a meeting since coming to Chicago and have decided that future conventions shall be held in the spring instead of the fall. That of next year may be held in the South and that of the following year in New York or some other Eastern city. The Foundry & Machine Exhibition Company has not yet decided whether it will have its exhibition in the fall next year, or whether it will follow the practice that has been unbroken thus far, of having it at the same time and place as the foundrymen's association conventions.

G. Rigg, in the Journal of Industrial and Engineering Chemistry, page 549, 1913, gives the results of his investigation of the deterioration of fire brick during use. He concludes that other things being equal the resistance to the action of corrosive slags and gases is greater the more compact and close-textured the brick is. Unsuitable clay or poor workmanship will cause the spalling of such brick. Close-textured fire brick containing considerable amounts of coarse material can be prepared if sufficient care be taken in sizing the grog so that the interstices between the larger fragments have been filled as completely as possible by smaller fragments.

The Machinery Markets

Trade conditions with both manufacturers and sellers of machinery continue dull. Industrial operations are slowing up somewhat, and the hesitancy of manufacturers everywhere to add to their equipment has halted demand. The close holding of money and uncertainty as to the ultimate effects of the new tariff are assigned as the chief causes of the dullness. New York is extremely quiet, although several houses have received or will receive orders from the Western Maryland Railway. New England manufacturers are troubled with money tightness, and while some report a slight improvement the majority finds trade slack. In Philadelphia buying has been light and irregular as a result of the tendency to await tariff results. Dullness is more pronounced in Cleveland, where manufacturers, including the automobile trade and railroads, are holding back and even single tool orders are not plentiful. Cincinnati manufacturers and foundries have had a quiet week. Buying in Detroit has been of a desultory character and there, too, manufacturers are inclined to defer action. Business in Chicago has been light, but prospects are of a better character. In Milwaukee a slight improvement has been noted. In the Central South power equipment has been in good demand and trade is pronounced normal for the season. An increased interest is shown in machine tools in St. Louis, but the conservatism, common elsewhere, has prevented any large sales. Farm machinery and appliances are moving in good volume in Birmingham. Business is slow in Texas, having been adversely affected by heavy floods in the central and southern parts of the State. On the Pacific coast the trade is looking forward to a good demand from the development of the Puget Sound Navy Yard; present conditions are fairly satisfactory, though the sales of machinery are not individually large.

New York

NEW YORK, October 15, 1913.

Several of the machine tool houses in New York are awaiting with interest final action by the Western Maryland Railway in the matter of its purchase of shop equipment for its Hagerstown, Md., shops. An extensive list of requirements was issued last spring, but no action toward closing was taken until recently. The number of machines on the original list has been greatly reduced and the buying will be close, high officials having it in charge. President J. M. Fitzgerald, while in New York a few days ago, gave attention to the matter. Some orders have been placed, others are practically settled, while others are still under consideration. Business generally has been extremely quiet in the local market. The few orders received have been scattered, a shipyard, for instance, taking a machine and a pump and condenser company taking another. Salesmen who have just covered their territory found the tendency on the part of manufacturers to hesitate in buying additional equipment to be a trifle more acute. A slowing down of industrial operations generally was found also. The holiday of Monday, Columbus Day, of course helped to make the week a quiet one.

E. L. Thomas, formerly secretary of the E. R. Thomas Motor Car Company, Buffalo, is fitting up the extensive manufacturing plant which was occupied by that company until recently and converting it for use as a group of manufacturing and power buildings. The buildings, which are of structural steel and concrete, contain about 200,000 sq. ft. of floor space and will be leased for manufacturing purposes. Electric power and heat will be generated and supplied to tenants as desired. A considerable proportion of the space in the buildings, which are located at Niagara, West Ferry and Breckenridge streets and the New York Central Railroad Belt Line, with exceptionally good switching facilities, has already been contracted for.

The Mohn & Hunter Laundry Company, Buffalo, has let contract for a new power house and boiler building to be added to its laundry plant at Genesee and Michigan streets.

The Iroquois Bag Company, Buffalo, will build and equip a two-story brick factory for the manufacture of bags at 465-467 Howard street, at a cost of about $15,000.

The General Chemical Company, Buffalo, is building a fireproof addition to its ore crushing plant at Abbott road, Buffalo River and the Buffalo Creek Railroad.

The Buffalo Copper Rolling Mill has let the contract for an addition to be made to its acid building at its plant, Military road and the New York Central Railroad.

Frank B. Hower, president Enterprise Oil Company, Buffalo, will build a factory and refining and compounding plant on Chandler street and the New York Central Railroad belt line. The first building will be 73 x 143 ft., two stories and basement, reinforced concrete, estimated cost $40,000.

Wollenberg Bros., 135 Goodyear avenue, Buffalo, will build an addition to their feed mill at Goodyear avenue and the West Shore Railroad.

The LaFrance Fire Engine Company, Elmira, N. Y., is having plans completed for an addition to its manufacturing plant, to be 120 x 130 ft., one and two stories.

The Eagle Wagon Works, Auburn, N. Y., is having plans prepared for a two-story addition 60 x 60 ft. to be be made to its plant.

The factory, power house and dry kiln to be erected by the Quaint Art Furniture Company on West Manlius street, Syracuse, N. Y., will be 42 x 256 ft., three stories and basement, of concrete, brick and steel, and will cost $60,000. Charles J. Lichison is president of the company.

The Will & Baumer Company, Syracuse, N. Y., is taking bids through Merrick & Randall, architects, Syracuse, for the erection of a three-story machine shop, 34 x 100 ft., at Liverpool road and Spring street.

The board of water commissioners, East Syracuse, N. Y., is having plans prepared for the construction of a waterworks system. F. M. Shepp is chairman.

The Minetto-Meriden Company, Minetto, N. Y., is planning to erect a transmission line from its plant at the Minetto dam to Oswego to supply electric power for manufacturing purposes. Application for a franchise has been filed.

The Russell Spaulding Company, Binghamton, N. Y., will erect and equip a bakery 50 x 106 ft., three stories and basement.

The Village Board, Goshen, N. Y., William Lovett, clerk, will soon advertise for bids for a sewage disposal plant to be built in connection with a new system of sewers from plans of Clyde Potts, engineer, 30 Church street, New York City.

The Batavia Rubber Company, Batavia, N. Y., is having plans prepared and will receive bids in about two weeks for a two-story and basement addition 85 x 101 ft. to be made to its factory; estimated cost $35,000.

Work is to be commenced at once on an addition to the mill of the Faith Knitting Company at Averill Park, Troy, N. Y., to be 50 x 100 ft., one story and basement, to cost with equipment about $60,000. William Mahoney is manager of the company.

The Morrow Mfg. Company, Elmira, N. Y., has let contracts for construction of a boiler house and coal storage building, 60 x 100 ft., one story, which it will add to its plant in that city.

A factory is to be erected and equipped at Monroe, N. Y., by the Jackson Mills Company, recently incorporated with a capital stock of $100,000 for the manufacture of cloth, etc.

Sealed proposals will be received by the Board of Trustees of the village of Madison, N. Y., until October 23 for the construction of a system of waterworks from plans of W. G. Stone & Son, engineers, Mann Building, Utica, N. Y. F. J. Welch is president.

The Diamond Match Company, which has just let contract for a $30,000 addition to its plant at Oswego, N. Y., has had plans completed for other buildings at the Oswego plant. Bids are being received and contracts will soon be let.

The Niagara Falls Search Light Company, Niagara Falls, N. Y., is building a two-story brick factory at Perry avenue and Eighth street.

The Van Wie Pump Company, manufacturer of centrifugal pumps, triplex pumps and engines, Syracuse, N. Y., recently increased its capital stock from $50,000 to $75,000 to cover extensive improvements made in its machine shop foundry and pattern room. A large proportion of the old equipment is being replaced with modern metal-working and woodworking machinery.

The A. C. Dutton Lumber Company, Poughkeepsie, N. Y., has purchased a site upon which it will erect a woodworking mill.

The American Felt Company, Dodgeville, N. Y., is completing plans for an addition which it will make to its factory.

Franklinville, N. Y., has voted a $10,000 issue of bonds for the construction of a pumping plant.

The Columbia Paper Bag Company, Van Alst avenue and Third street, Long Island City, New York, whose plant was damaged by fire recently, will build a three-story structure at a cost of $60,000.

Philadelphia

PHILADELPHIA, PA., October 13, 1913.

The volume of business developed the past week has been extremely light. Buyers are moving slowly, awaiting developments. Until it is clearly defined what the effect of the lowered tariff duties on the trade will be, many consumers as well as producers of machinery and tools will be content to mark time. Sales have been irregular, both manufacturers and merchants complaining of the lack of sales of any magnitude. Railway buying is a negligible quality. Quite a good demand continues, however, for power equipment. The second-hand machinery market is dull in practically every line. Gray-iron foundries are fairly active but dullness still rules in the demand for steel castings.

Bachman & Co., Stock Exchange Building, this city, are reported to be taking bids on plans and specifications together with equipment for a gas and electric power plant to be erected in Georgetown, S. C., and for a gas generating plant at Gastonia, N. C.

M. Ward Easby, engineer, is reported taking sub-bids for all lines for the erection of a two-story factory addition 54 x 140 ft., slow-burning construction, for the Alba Carpet & Rug Company, Oxford and Hedge streets, this city.

The L. & B Grease Cup Company, this city, has been incorporated under Delaware laws, with a capital of $100,000 to manufacture a compressed air grease cup. Proposed plans of the company are not yet available.

Ballinger & Perrot, engineers, Philadelphia, have awarded the contract for a large manufacturing building, to be erected in Long Island City, N. Y., for the New York Consolidated Card Company, to the Turner Construction Company, of New York. The building will be five stories and basement, 70 x 457 ft. Windows will have rolled steel frames and the building will be fireproof. Three large freight elevators are to be installed. Provisions are also made for a boiler, engine and generator plant of 1000 hp. A garage with storage facilities for gasoline and oil will also be provided. The specifications for the mechanical equipment will be ready for estimate in a few weeks.

Plans have practically been completed for an addition to the plant of the North Penn Ice Mfg. Company at Twenty-sixth street and Sedgely avenue. The improvement will consist of a one-story building, approximately 100 x 120 ft.

The trustees of the State Hospital for the Criminal Insane, Fairview, Pa., will receive proposals for a new workshop and other buildings, also separate proposals for the heating and ventilating apparatus and electrical equipment. Bids will be received until October 25. Plans and specifications may be obtained at the office of J. C. M. Shirk, architect, 518 Philadelphia Bank Building, on a refundable deposit of $100.

William A. Dechaut, engineer, Reading, Pa., is preparing plans and specifications for a pumping station to be erected and equipped at Sunbury, Pa. Details are not yet available.

Local contractors are estimating on a proposed addition to the plant at Trenton, N. J., of the American Steel & Wire Company, where extensive improvements are planned. Present plans include a three-story building, 72 x 172 ft., and a one-story building, 25 x 55 ft.

The A. M. Leoni Mfg. Company, Wilmington, Del., has been incorporated with a capital of $500,000 to manufacture machinery and tools. The incorporators named are W. M. Pyle, George G. Steigler and George W. Hopkins, all of Wilmington, Del.

New England

BOSTON, MASS., October 14, 1913.

Manufacturers are troubled by the money market. The banks are extraordinarily conservative in their loans and some of the strongest houses in New England are finding difficulty in placing their paper. Collections are slow and the fact is naturally attributed to the general financial condition. It is noteworthy that the surplus of the strong banks is increasing. Without a doubt this policy is keeping back business. Some houses that are very busy, with little sign of abatement ahead, would like to expand, but are compelled to go more slowly than their own well-considered judgment advises. Some of the machinery builders report a continued slight improvement in inquiries and orders, but as a whole trade is really dull. In manufacturing lines—making a distinction between equipment and its products—factories are at least average busy. For example, the demand for screws and other shelf hardware is consistently good. In some cases merchants who have been slow in stocking up because of expectations of better terms resulting from the new tariff have been disappointed in that respect and are now placing orders. Stocks generally are low, which fact should have an influence from now on. The effect of the tariff changes is not a source of much worry apparently. The financial situation is the real source of trouble.

The Noiseless Typewriter Company, Middletown, Conn., has been placed in the hands of a receiver by order of the United States District Court.

The Oliver Whyte Company, Medford, Mass., will build a factory 65 x 168 ft.

John J. Roche, Hartford, Conn., will build a factory 50 x 125 ft., two stories, brick, mill construction.

The Burns-Bassick Company, New Haven, Conn., is planning the erection of an additional building next spring.

The Acme Tension Spring Company, Merrimac, Mass., proposes to build a factory in that town upon land recently purchased.

The Coburn Trolley Track Mfg. Company, Holyoke, Mass., will erect an addition to its factory at Willimansett 96 x 186 ft., one story, of brick, mill construction, with sawtooth roof.

The United States Armory, Springfield, Mass., has prepared plans for a power plant to cost $50,000. The installation will include two steam turbine electro-generator sets.

The Skinner Chuck Company, New Britain, Conn., has postponed the building of its proposed additional factory until spring.

The Hendee Mfg. Company, Springfield, Mass., manufacturer of motorcycles, has reorganized with an increased capital, the new funds to take care of the large additions to the plant which have been made recently. The new stock has all been subscribed. The company is preparing for a very large output for the 1914 trade.

Cincinnati

CINCINNATI, OHIO, October 13, 1913.

The past week has been an extremely dull one with practically all manufacturers. The local machine tool builders are not operating their plants with anything like full forces, and there is little business in sight. The Western Maryland Railroad Company recently purchased a lot of machine tools in this market and there has been some sporadic buying by the Big Four and Pennsylvania systems, but the total business placed was not of enough magnitude to relieve the general situation. In addition to cutting down its working force some time ago one large manufacturer was compelled to operate its machine shop on the five-day plan in order to avoid piling up any large stocks. There has also been quite a lull with the foundries, and with probably two exceptions none is operating with anything like a full force. The second-hand machinery business shows some improvement, and recently several contracts were secured in the South for rebuilt electrical equipment.

A large number of local and outside manufacturers have engaged space in the proposed Manufacturers' Permanent Building to be erected near the corner of Vine and Fourth streets. Luke W. Smith is president of the association.

The Post-Glover Electric Company, Cincinnati, dealer in electrical supplies, has increased its capital stock from $50,000 to $120,000.

The Cincinnati Mfg. Company, Cincinnati, will soon move its present location on Sixth street to a larger building on Gest street, which will be used for the manufacture of fly screens and other wire specialties.

F. L. Packard, architect, Columbus, Ohio, is preparing plans for a large interurban station for the Columbus Depot Company. The proposed station is estimated to cost over $1,000,000 and the company expects to be ready for bids not later than January 1.

F. J. Bender, Portsmouth, Ohio, is fitting up a small machine shop at 906 Gallia avenue.

D. W. McGrath, Columbus, Ohio, has been awarded the contract for a six-story reinforced concrete factory for the Hanna Paint Company, mention of whose plans was made several weeks ago.

The Ralston Steel Car Company, Columbus, Ohio, has plans under way for an addition to its plant that will be 100 x 300 ft., one story, of steel construction. Nothing is yet known as to the company's machinery requirements.

A power plant addition to the Dayton State Hospital, Dayton, Ohio, 36 x 45 ft., is now in course of erection. Practically the necessary equipment has been purchased.

An unconfirmed report is in circulation that the Grant Motor Company intends moving its automobile plant from Detroit, Mich., to Dayton, Ohio. No details are available as to probable additional machinery requirements.

The directors of public service, Springfield, Ohio, will open bids October 20 for a large quantity of double hub water valves.

The Jackson Shear Company, Fremont, Ohio, is constructing an addition to its plant that will be used for storing castings and malleables for shears.

An ice and cold storage plant will be built at Ada, Ohio, by the Storer Bros. Company, recently incorporated with $25,000 capital stock.

The Black Diamond Mfg. Company, Cincinnati, manufacturer of belt dressings and other specialties, has acquired additional land adjoining its plant at 1217 Bank street, on which a building will be erected for manufacturing and storage purposes.

The board of trustees, Ohio University, Athens, Ohio, will open bids November 3 for a power and lighting plant. I. M. Foster, Athens, is secretary of the board.

Cleveland

CLEVELAND, OHIO, October 14, 1913.

The dullness in the local machinery market which has continued for some time is more pronounced. Dealers have no new lists to figure on and orders for single tools are not plentiful. In view of present conditions, manufacturers do not care to add to their machinery equipment. Railroads are holding back. Manufacturing plants in most metal working lines are still fairly well filled with work, but not a great deal of new business is coming out. A considerable slackening of activity in the automobile trade is noticeable. Automobile makers are holding back on orders, and as a result many makers of automobile parts are not very busy. Conditions in the foundry trade generally continue satisfactory. Pipe foundries, however, are complaining of a scarcity of orders, this being attributed to the deferring of municipal improvements because of the difficulties experienced by municipalities in marketing bonds.

The Globe Brass Mfg. Company, Cleveland, has increased its capitalization from $50,000 to $65,000.

Stationary vacuum cleaners operated by water power will be manufactured by the Cyclone Vacuum Cleaner Company, Cleveland, Ohio, which has been incorporated with a capital stock of $50,000 by Henry P. Angel, J. C. Green, Walter Reece and others. The company has temporary offices at 716 Hippodrome Building.

The National Telephone Supply Company, Cleveland, has bought a site on Superior avenue, near East Forty-ninth street, on which it plans to build a new plant next spring.

Plans for the new plant to be erected at Sarnia, Ont., by the Cleveland Foundry Company, under the name of the Perfection Stove Company, have been completed by George S. Ryder & Co., engineers, Cleveland. The main building will be 180 x 280 ft. Several other buildings will be erected.

A new plant will be erected by the Folberth Auto Specialty Company, 2929 Lorain avenue, Cleveland, on a new site at Lake avenue and West Eightieth street. The building will be a one-story structure, 105 x 135 ft. Part of it will be used for manufacturing and the remainder for a garage.

The Universal Carburetor Company, Cleveland, has been incorporated with a capitalization of $10,000 by Geo. A. Hynon, F. H. Pelton and others to manufacture carburetors.

It is reported that the Portage Rubber Company, Barberton, Ohio, will enlarge its plant by the erection of a three-story addition, 35 x 140 ft.

The Reeves Bros. Company, Alliance, Ohio, has increased its capitalization from $200,000 to $600,000.

The Machinery Mfg. Company, Toledo, has been incorporated with a capitalization of $25,000 by F. R. Bohm, A. M. Amberg and others.

It is announced that the Ohio C. Barber Mining & Fertilizer Company recently incorporated with a capitalization of $100,000, will build a power plant at Howenstine, near Canton, Ohio. The general offices of the company are in Akron. Homer V. Briggle is general manager.

The Ravenna Motor Truck Company, Ravenna, Ohio, will enlarge its plant by the erection of an addition, 50 x 90 ft.

The Defiance Pressed Steel Company, Defiance, Ohio, had awarded a contract for the erection of a plant addition, 120 x 120 ft. It will be used largely for stock and wareroom purposes.

The McGraw Tire & Rubber Company, East Palestine, Ohio, will enlarge its plant by the erection of an additional factory building.

Detroit

DETROIT, MICH., October 13, 1913.

A light volume of business is reported by local machine tool merchants the past week. The buying has been desultory and has been confined mostly to single tools. Buyers of tools, as a general rule, seem to be inclined to defer purchases, and while considerable inquiry develops, business closes slowly. The second-hand machinery market is also dull. Power equipment is in fair demand and the smaller units of electrical equipment are in like request. Both gray-iron and steel castings plants are moderately well engaged. General building construction work shows an increase and the exceptionally fine weather is encouraging to contractors.

The Peter Smith Heater Company, Detroit, owing to rapidly increasing business, has purchased a property of eight and one-half acres, improved with a four-story factory building and a detached power plant. The plant at present is occupied by the Edward G. Budd Mfg. Company, which is preparing to combine its Detroit branch with its main plant at Philadelphia.

The Venus Electric Lamp Company, Detroit, has been incorporated with $2000 capital stock to manufacture motorcycle lamps. Paul T. Krastin is the principal stockholder.

The Jeffery-DeWitt Company, Detroit, manufacturer of spark plugs, has been reincorporated under Maine laws, with a capital stock of $500,000. It is stated that the company plans the erection of an addition to its plant 50 x 200 ft., three stories.

The Acme Foundry Company, Detroit, has awarded contracts for the erection of a large addition to its present foundry plant on Isabella street.

F. S. Salter, Duane Tibbitts and W. W. McIntire, Detroit, have incorporated a company with $50,000 capital stock and will manufacture cyclecars.

The Michigan Stamping Company, Detroit, has begun the erection of a three-story reinforced concrete factory building on Bellevue avenue.

The Armitage Leather Company, 87 West Congress street, has completed negotiations for a larger factory and is now installing additional equipment of special design for use in manufacturing its products.

Plans have been completed by Siewieck Bros., Detroit, for a one-story machine shop. The building will be 28 x 104 ft., of brick construction.

The American Lady Corset Company, Detroit, will erect a large branch factory at Jackson, Mich.

Grinnell Bros., Detroit, piano manufacturers, have purchased the Chase & Baker Piano Company plant at Holly, Mich., which they will enlarge and improve.

The Western Paper Makers Chemical Company, Kalamazoo, Mich., has been incorporated with $100,000 capital stock. The construction of a plant to cost $40,000 will be commenced at once.

The Pontiac Motor Castings Company, Pontiac, Mich., is completing an addition to its plant which will double its capacity. The addition will be devoted to the manufacture of gray-iron castings.

The Spenny Motor Car Company, capitalized at $500,000, will establish a plant at Holland, Mich. A factory has been secured and the equipment is now being contracted for. C. A. Spenny is president.

The Stack Lumber Company, Escanaba, Mich., has been incorporated with a capital stock of $1,500,000.

It is reported that the company will erect large lumber mills.

The Northern Michigan Water Company, Escanaba, Mich., has taken over the property of the Escanaba Water Company and has issued $100,000 in bonds, a large proportion of which will be used in making improvements to the property, including the installation of a new pump.

The Dail Steel Products Company, Lansing, Mich., has been incorporated with $25,000 capital stock by Ray Potter, Ernest I. Dail and F. N. Arbaugh. The new company takes over the business of E. I. Dail, manufacturer of metal specialties.

The Metal Sectional Mfg. Company, Benton Harbor, Mich., is making a number of improvements to its plant and is installing a large amount of modern machinery.

The plant of the Montague Iron Works, Montague, Mich., has been sold at receiver's sale to the Lake Sand Company, of South Chicago. The purchaser will dismantle the plant.

The taxpayers of Wayne, Mich., have voted a $27,000 issue of bonds for the construction of a water works system. Smith & Boulay, Toledo, are the engineers in charge.

The taxpayers of Roscommon, Mich., will vote shortly on bonds to rebuild the municipal electric light plant which was burned recently.

The Acme Gas Engine Company, Lansing, Mich., has been incorporated with $80,000 capital stock by Frederick Thoman, Jacob Gansley and Lawrence Price. The new company will take over the plant and equipment of the defunct Peerless Engine Company at Lansing.

The Hinkley Handle Company, Alanson, Mich., is erecting a mill to have 15,000 sq. ft. of floor space. It is in the market for automatic broom-handle lathes, sawmill equipment, an electric light plant, two 72-in. x 18 ft. boilers to furnish steam for three engines. C. L. Hinkley is secretary.

Chicago

CHICAGO, ILL., October 13, 1913.

The demand for machinery in the West continues light. During the current week local dealers are giving the greater part of their attention to the excellent exhibit of machine tools at the Foundry & Machine Exhibition Company. It is reported that the contract for the steel work for the new Baldwin Locomotive Works plant near Chicago has been let. This brings within the definite future prospects for a very large purchase of machinery for this plant. Railroads continue to hold off in connection with various inquiries that have been in the market for some time, confining their purchases to the few incidental tools for which there is immediate need.

The Tausey Varnish Company, McCormick Building, Chicago, is planning the erection of a two-story brick factory at 520 West Twenty-fifth street at a cost of $15,000.

R. S. Lindstrom, 3400 South Center avenue, Chicago, is preparing plans for the erection of a three-story brick factory at Twenty-fourth and Butler streets for the Holmquist Company at a cost of $35,000.

Robert C. Berlin, 19 South La Salle street, Chicago, has completed plans for a four-story warehouse 52 x 103 ft. to be erected for L. G. Brand at Ade street and Carroll avenue at a cost of $35,000.

Hine Bros., Chicago, are having plans prepared for a two-story factory 83 x 106 ft. to be erected at 1023 South Ashland avenue.

The Chicago & Western Indiana Railway Company has had plans prepared for a one-story roundhouse, locomotive shop, machine shop, storehouse, wood mill, turntable and ash pits to be built at Clearing, near Chicago, contracts for which have been let.

The N. C. C. & St. L. Railway Company is erecting a one-story brick machine shop 90 x 283 ft. at Ninety-fourth street and Adams avenue, Chicago, at a cost of $15,000.

The Pullman Company, Chicago, will build a one-story brick battery house 59 x 184 ft. at an approximate cost of $10,000.

The Semet-Solvay Company will erect a two-story brick scrubber house 81 x 82 ft. at 11,250 Hoxie avenue, Chicago, the cost of which is estimated at $12,000.

Carl Teich, Chicago, has had plans prepared for a one-story brick factory 106 x 141 ft., to be erected at 2251 Oakdale avenue at an estimated cost of $25,000.

The Chicago Carriage and Trimming Company, Chicago, is having plans prepared for a three-story brick factory at 3514-20 South Michigan boulevard to cost $65,000.

The American Wood Waste Company, 52 North Clark street, Chicago, will establish a plant at Geneva, Ala., for utilizing wood waste product, etc. Proposals are invited on future plants, specifications for which will be furnished.

The National Car Equipment Company 80 East Jackson boulevard, Chicago, has been incorporated with a capital stock of $50,000 by Charles Brearley Moore, Charles D. Carscadin and Merrit C. Beymer, to manufacture and deal in railway equipment and supplies.

The Simplex Weigher Company of Wichita, Kan., and Weineke & Co. of Springfield, Ill., will be operated in conjunction with the Hart Grain Weigher Company, Peoria, Ill., and approximately $100,000 will be invested in improvements.

The Forest City Wire Works, Rockford, Ill., has been incorporated with a capital of $5,000 for manufacturing specialties by Fred Collins, Edwin H. Golding and William D. Knight.

Harry C. Wickwire, Rockford, Ill., has purchased a site for a two-story fireproof factory 60 x 80 ft., which is to be equipped with woodworking machinery.

The Hollister-Whitney Company, elevator manufacturer, Quincy, Ill., has purchased additional property on which it will erect a factory building 100 x 200 ft. at an estimated cost of $30,000.

The Capital City Woolen Mills, Des Moines, Iowa, has started work on a new two-story addition 60 x 132 ft., to cost about $30,000, which will double the capacity of the garment department.

The Ottumwa-Moline Pump Company of Ottumwa, Iowa, owned and controlled by Moline men, is to be revived and a new factory is promised for that city.

J. A. Gunn, president of the Gould Balance Valve Company, Kellogg, Iowa, reports that the company has leased ground from the Chicago, Rock Island & Pacific Railway on which it plans to erect a foundry and warehouse.

The Western Motor Appliance Company, Charles City, Iowa, has been incorporated with a capital stock of $25,000 for the manufacture of appliances and attachments for gas, gasoline and kerosene engines. George G. Hintz, William Butz, W. J. Frevert and H. E. McCray are the directors.

Bids will be received by the village of Polk, Neb., until October 20 for the installation of a $4000 electric light plant. Address the city clerk.

The Stanley Motor Company, Liberty, Ind., has been incorporated with a capital stock of $5000 to manufacture and sell motor vehicles. Incorporators are R. C. Connor, W. F. Stanley and C. C. Connor.

Milwaukee

MILWAUKEE, WIS., October 13, 1913.

The slight improvement which is noticeable in the machinery trade is undoubtedly due to an easier feeling in all lines of industry since the tariff has been settled. Outside of the machine tool trade, which continues to set a fast pace, operations in machinery manufacture are only fair. There is good business in Milwaukee and throughout Wisconsin which has been waiting for a propitious time for projection, and it is believed the time is soon at hand when these prospects will be turned into actual purchases. Some good municipal business in the line of power and electrical equipment is in sight. Second-hand machinery business is slow and dealers are finding stocks piling up.

It is unofficially reported that the Allis-Chalmers Mfg. Company, Milwaukee, is carrying out its consolidation policy even in Milwaukee and will abandon the Reliance works on Clinton street, transferring the Reliance equipment to the main works at West Allis. At this time the company is engaged in consolidating its two Chicago plants with the West Allis shops. The Reliance works formerly comprised the main works of the concern, having been built by the old E. P. Allis Company, which is the nucleus of the present company. The buildings are mostly of frame construction and it is said that the entire property has been purchased by one of the railroad systems, which will remove the shop buildings and use the site for freight terminal facilities. The company intends to concentrate its entire American operations at the main shops in West Allis.

The Metro-Nite Company, Milwaukee, has been incorporated with a capital stock of $100,000 to develop mineral beds in the upper peninsula of Michigan. It is planned to establish a 100-ton concentrating mill next spring and meanwhile the reduction will be taken care

of by the mills of the Michigan Quartz Silica Company. James V. Rohan, of Racine, is president; Herbert L. Johnson, of Milwaukee, vice-president, and Edward Copps secretary and treasurer.

The Koehring Machine Company, Milwaukee, manufacturer of steam-operated concrete mixing machinery, will build a $15,000 executive building adjoining its large plant at Center and Thirtieth streets, Milwaukee, at once. Since the plant was established the company has maintained its administrative department in the Germania Building. Phil. A. Koehring is secretary-treasurer and manager.

Officials of the Falk Company, steel founder and machinist, Milwaukee, state that the increase in the company's capital stock from $1,000,000 to $1,250,000 has been distributed among the present stockholders. The new issue is 6 per cent. preferred, while the former capital stock of $1,000,000 was entirely common. Herman W. Falk is president.

The Chicago, Racine & Milwaukee Steamship Line, 289 East Water street, Milwaukee, has purchased the river frontage at Broadway and Erie streets and proposes to erect a modern dock and freight house, costing $150,000, early next year. The dockage space is 130 x 433 ft.

A $200,000 building 100 x 125 ft., designed for light manufacturing, is to be erected at Jackson and Huron streets, Milwaukee, by the Ticonic Investment Company, which owns much acreage in downtown Milwaukee. Work will begin January 1. A heating and electric light and power plant will be included in the plans. Horace A. J. Upham is manager.

The Robinson Auto Heater Company, of Milwaukee, has been organized with $25,000 capital to manufacture and market a device for heating automobiles by utilizing exhaust gases. J. W. Robinson and H. L. Kellogg are the incorporators.

The W. M. Durant Company, 523 Market street, Milwaukee, manufacturer of counting machines, registers, etc., has purchased a site at Buffum street and Reservoir avenue, and will erect a new plant costing $20,000.

The Milwaukee-Western Cold Storage Company, Milwaukee, formerly the United Cold Storage Company, is preparing for the construction of an annex to its present works at 178-198 Florida street as soon as the work of remodeling the old plant is completed. The annex will cost $650,000, including the refrigerating and additional power equipment. Work will begin about November 15. Andrew Olsten, Chicago, is architect.

The Steam Appliance Company, of Milwaukee, will move into its new plant at Sixty-third avenue and Burnham street, West Allis, about November 1. The shop buildings is 66 x 80 ft., two stories, of brick and steel.

The Aluminum Goods Mfg. Company, Manitowoc, Wis., will complete at its plant at Two Rivers, Wis., two new brick and cement buildings before January 1, and next spring another will be built. The boiler rooms will be equipped with four boilers and the company is installing a 500-kw. turbine to furnish power for the machinery.

The plant of the Harvey Spring Company, Racine, has been damaged $5000 by fire. Only the roof was burned. Repairs are being completed.

The Jacobsen & Ackerman Company, general engineering, Grand Rapids, Wis., has been awarded a contract for the complete equipment of a hydroelectric plant for the Rock River Power Company, at Sterling, Ill. The plant will be operated by six large water wheels, 10 ft. 4 in. in diameter. The contract includes the construction of buildings and drafts. The dam has been completed.

The K. & F. Mfg. Company, Kenosha, manufacturer of glass and metal containers, has found it necessary to greatly enlarge its manufacturing facilities and purchase new equipment. The company moved from Chicago several months ago and took part of the Peter Pirsch factory. Until a decision relative to building a plant of its own, the company will take more space in this shop. The company will increase its capital stock $25,000 at once. W. M. Kavanagh, of Chicago, is president and James H. Fullen, of Kenosha, is secretary-treasurer and general manager.

The Chicago Steel Tape Company, of LaCrosse, Wis., recently incorporated with a capital stock of $10,000, is in the market for additional machinery for the production of tools and instruments for surveyors, architects and engineers. Address Walter S. Woods, LaCrosse.

Wheeling

WHEELING, W. VA., October 13, 1913.

C. W. Bates & Co., Wheeling, W. Va., have secured contract for a large addition to the plant of the United States Stamping Company.

The Novelty Clay Forming Company, Newell, W. Va., has been incorporated with $25,000 capital stock to manufacture porcelain insulators for electrical purposes. George S. Howard is named as one of the principal incorporators.

The Graham Land & Improvement Company, Graham, W. Va., is reported to be planning the installation of a waterworks system at that point.

The Williamson Light & Ice Company, Williamson, W. Va., is considering installing a 35-ton motor driven ice machine.

The buildings of the Chester Rubber Tire & Tube Company, at Chester, W. Va., are being prepared for the installation of machinery. It is expected to have the plant in operation by November 15.

The Olney-Dunbar Glass Company, Dunbar, W. Va., has been incorporated with $75,000 capital stock by Ralph K. Kane, George Bowen, Noblesville, W. Va.; Charles F. Myers, Carmel, W. Va., and others.

The Allegheny Power Company, White Sulphur Springs, W. Va., has been incorporated with $25,000 capital stock by A. E., J. L., D. F. and Mary B. Huddleston, of White Sulphur Springs.

The Ohio Valley Enamel Company, Huntington, W. Va., has let the contract for the construction of a modern factory building to the Ohio Valley Construction Company. P. E. Burt, secretary and general manager of the West Fayette Stamping & Enamel Company, Lafayette, Ohio, will be in charge of the new plant. The main factory building will be 100 x 150 ft.

The Huntington Handle Mfg. Company, Huntington, W. Va., is contemplating the establishing of a branch plant in Narrows, Va.

The Standard Textile Machine Company, Danville, Va., has been organized with $150,000 capital stock. J. J. Westbrook is president of the company.

The Charlottesville Silk Mills, Charlottesville, Va., organized with $75,000 capital stock, will equip a plant. E. C. Rolmer, Brooklyn, N. Y., is president, and E. C. McCarthy, Charlottesville, is secretary.

The Central South

LOUISVILLE, KY., October 14, 1913.

Business is just about normal for this season. In some directions trade is steadily making gains, and the demand for power equipment, especially boilers, leaves little to be desired, as manufacturers of this class of equipment are being kept busy figuring on new jobs and expansions of established enterprises. A number of large central station projects contemplating the distribution of electric current for industrial purposes over a wide area are attracting attention in Kentucky trade circles at present. Municipal bond issues will be voted on in a number of communities to provide funds for important improvements. In Louisville a $1,000,000 issue is to provide funds for a number of new buildings, which will be important from a machinery standpoint.

A new mill supply company has been organized in Louisville, the Southern Mfg. & Supply Company, incorporated with $15,000 capital stock. It will be located at 338 West Main street. George T. Branham is manager.

The plant of the Louisville Tin & Stove Company, located on Maple street, between Twelfth and Thirteenth, was destroyed by fire last week with $120,000 loss. The machinery of the company, which did finishing, nickeling, etc., but no foundry work, is said to be an entire loss. The company has already decided to rebuild. C. B. Edmonds is secretary of the company.

The Imperial Wire & Iron Works will build a new factory at Twenty-fourth and Maple streets. The building proper will cost $7500. A considerable amount of new equipment will be needed. The present offices of the company are at Hancock and Jefferson streets.

It is reported that the Consolidation Coal Company plans the enlargement of its power plant at Jenkins, Ky., so as to develop 15,000 kw. The company is building transmission lines and supplying current to coal mines and municipalities throughout eastern Kentucky.

A new building is to be erected in Lexington, Ky., for the use of the Fayette Motor Company. The repair department will be materially enlarged. W. P. Price is vice-president of the company.

W. J. Debaum has plans for enlarging the electric

light plant which he controls at Perryville, Ky.; also his ice plant.

E. L. Proctor, Winchester, Ky., is in the market for machinery for a creamery which he is to establish there.

Flemingsburg, Ky., has voted a $25,000 issue of bonds for waterworks.

Melton Bros., flour mill operators at Dixon, Ky., are considering the establishment of an electric light plant. They will probably purchase used equipment.

The American Metal Tie Company, Paducah, Ky., recently incorporated with $500,000 capital stock, plans the erection of a plant. Charles E. Stavely, Harry D. Leigh and others are interested.

A reference made recently in *The Iron Age* to the Cloverport Bolt & Machine Company, Cloverport, Ky., should have been to the Cloverport Boat & Machine Company. It is building a new plant.

The Kentucky Block Coal Company, Hazard, Ky., announces that it is ready to receive prices on equipment for a mine which it is to open at once. John B. Allen is manager of the company.

Erlie Hale, Murray, Ky., plans the erection of a canning factory of considerable capacity.

The Dix River Power Company, of which L. B. Herrington, Richmond, Ky., is president, has recently purchased property along the river for use in the construction of a dam and reservoir to be used in generating power. The company was organized about a year ago and plans to develop current to serve many of the towns in central Kentucky.

Kenton, Tenn., has voted a $30,000 issue of bonds for the construction of an electric light plant and waterworks.

The W. C. Williams Company, Nashville, Tenn., is being organized by George W. Turner, W. D. Rushton and others for the purpose of establishing an abattoir.

The Allen Engineering Company, Memphis, Tenn., has disposed of its plant to the Layne & Bowler Company, Houston, Tex., which is to operate the Memphis shop as a branch. It manufactures screens and pumps, specializing in irrigation equipment. The plant at Memphis consists of a foundry, machine shop, etc.

Anthony S. Hill, Memphis, Tenn., is in the market for equipment for a sawmill. Two bandmills will be installed and two boilers also will be needed.

The Tennessee Canning Company, Knoxville, Tenn., is reported to be planning the construction of a plant, the cost of which will be in the neighborhood of $25,000.

The Beare Bros. Ice Company, Jackson, Tenn., will enlarge its plant.

The Lone Mountain Lumber Company, Harriman, Tenn., has been incorporated with $50,000 capital stock by George E. Boyd, R. B. Carroll and others and will equip a plant.

The Crenshaw-Gary Lumber Company, Memphis, Tenn., has increased its capitalization from $50,000 to $75,000 for the purpose of extending its plant equipment.

Birmingham

BIRMINGHAM, ALA., October 11, 1913.

While there has not been as much activity in machinery circles during the past week, in general, there has been a greater flow of rural merchants to the city and the demand for farm utensils and appliances is greater, owing to the continued financial betterment of the farmers. The district which the Birmingham wholesalers supply has had excellent crops, and prices have been high. Dealers are satisfied with conditions and prospects.

J. F. Ames, owner of the Selma Mfg. Company, Selma, Ala., will establish a lace mill.

Bessemer Fire Brick Company, Bessemer, Ala., will install equipment for the manufacture of hollow fireproof tile.

The Riceville Cooperage Company, Riceville, Tenn., will establish a plant at Oneonta, Ala.

The Southern Box & Mfg. Company, Birmingham, Ala., will install additions to its plant for the manufacture of novelty work, crates, etc. The company's capital stock has been increased to $100,000. J. C. Gorham is president and W. C. Sterrett, treasurer.

The Bridgeport Spoke Works, Bridgeport, Ala., has been incorporated with a capital stock of $10,000 to manufacture spokes by G. W. Williams and others.

The Barnhill-Ferndon Company has been granted a franchise at Homerville, Ga., to operate an electric lighting plant.

W. H. Goodloe, Macon, Ga., has made a preliminary survey for a water works system at Midville, Ga.

The American Fertilizer Company, Savannah, Ga., has been incorporated with a capital stock of $50,000 to manufacture fertilizers by G. H. Howard, Columbus, Ga., and others.

The Piedmont Portland Cement Company, Atlanta, Ga., will increase capacity of its plant at Portland, Ga., to 1200 bbl. by installing additional machinery.

The Savannah Stock Yards & Cold Storage Company, Savannah, Ga., will enlarge and remodel its cold storage plant at Tybee.

High Springs, Fla., has voted a $30,000 issue of bonds for water and electric light plants.

The Morgan Lumber Company, Jacksonville, Fla., will establish sawmills in St. John's County.

The Baker Cup Company, Pensacola, Fla., has been incorporated with a capital stock of $50,000 to manufacture metal cups. A. H. Baker is president.

The city of Kissimmee, Fla., will expend about $7500 in increasing the capacity of its electric light plant. A dynamo and other units are to be installed.

The Sawgrass Pulp & Paper Company, Palmetto, Fla., has been incorporated with a capital stock of $250,000 and plans to build a two-ton plant for manufacturing pulp and paper from sawgrass. F. F. Strong, Palmetto, is president; H. E. Ellis, Palmetto, is vice-president; W. H. Turner, Bradentown, is secretary.

St. Louis

ST. LOUIS, MO., October 13, 1913.

Machine tool users continue to show a gradually increasing interest but no large purchases have been made for some time because of the conservatism which prevents any extensive commitments on extensions. However, a reasonable trade exists on single tools for increasing capacity, together with some replacement demand. No large lists are out and none seem likely to come into the market until the nervous condition of the manufacturing industries over the tariff and currency situations has been somewhat modified. Business in general continues fairly good and no complaints are heard on the score of lack of demand from consuming interests.

The St. Louis Frog & Switch Company, St. Louis, has bought a new site in the northwestern part of St. Louis and will erect a large extension of its present plant.

The Safety Valve & Appliance Company, St. Louis, has been incorporated with a capital stock of $20,000 by Joseph F. Tracy, Fred W. Brand and Thomas J. Sheehan to manufacture valves and other mechanical appliances.

The St. Louis Storage Battery Company, St. Louis, has been incorporated with a capital stock of $12,000 by Joseph, Firmin and Louis Desloge to manufacture storage batteries and other electrical and mechanical apparatus.

The Arrow Chemical Company, St. Louis, has been incorporated with a capital stock of $12,000 by John C. Hall, Stanley Stokes and J. C. Deane to manufacture chemical products.

The Geo. W. Miles Timber & Lumber Company, St. Louis, has increased its capital stock from $20,000 to $32,000 for the purpose of extending its mechanical equipment.

The National Camera Co., St. Louis, has leased new and larger quarters and will extend its equipment before removing to the new location, a four-story building, at 1414 Chestnut street.

The Weber-Browne Supply Company, St. Louis, has been incorporated with a capital stock of $12,000 by E. D. R. Browne, Edward Weber, Clarence T. Case and others to manufacture soaps, druggists' sundries, etc.

The Louisiana Lumber Company, St. Louis, has increased its capital from $50,000 to $100,000 for the purpose of increasing its mill equipment and extending its operations.

The Plantation Equipment Company, Valley Park, Mo., has been incorporated with a capital of $100,000 by William O. Zelle, William G. Brennecke, Henry C. Zelle, Conway Elder and others to manufacture plantation equipment.

The Gate City Oil Company, Kansas City, Mo., has been incorporated with a capital stock of $25,000 by James T. Goodal, Daniel Sayre and J. L. Riley to refine oil, etc.

The flour milling plant of the Southwestern Milling Company, at Kansas City, Mo., was destroyed by fire Friday, October 10, with a total loss of about $400,000. It is reported that the mill and equipment, with a capacity of 3000 barrels per day, will be replaced.

The North Missouri Light & Power Company, New London, Mo., has been incorporated by S. C. Gill, M. C. Biggs and W. E. Keithley and will proceed to equip at once.

The Rosedale Crushed Stone Company, Kansas City, Mo., has been incorporated with a capital stock of $25,000 by F. W. Freeborn, A. B. Jackson and H. A. Mohr.

The manager of the Orpheum Theatre of Kansas City, Mo., has let a contract for the construction and equipment of a new theatre building to cost about $350,000 and to contain its own lighting, power, ventilating and other equipment.

The city of Potosi, Mo., has voted a bond issue of $14,000 for the construction of a waterworks plant.

The Graham Domestic Laundry Company, Kansas City, Mo., has been incorporated with a capital stock of $15,000 by J. T. Townsend, John M. Graham and M. W. Townsend, and will equip a steam laundry.

The Excello Feed Milling Company, St. Joseph, Mo., has increased its capital stock from $75,000 to $100,000 for the purpose of enlarging its plant.

The Kansas City Terminal Railway Company, Kansas City, Mo., has plans for a power house to develop 3000 hp. John V. Hanna is the engineer.

The city of Albany, Mo., will build an electric light and power plant under the direction of Rollins & Westover, engineers, Kansas City, Mo.

A. B. Steen, Oil City, Pa., has bought the plant of the Eagle Machine Works, at Hope, Ark., and announces his intention to enlarge the equipment.

The Chicago Mill & Lumber Company will equip a hardwood mill, veneer plant and box factory at Helena, Ark.

The Sheldon Handle Company, Malvern, Ark., will rebuild the handle factory which was recently burned, with a loss of $15,000 on its equipment.

Black & Norton's axe handle factory at Brinkley, Ark,. is reported burned with a loss of $8500 on equipment. It will be re-equipped, it is stated.

The Rapid Transit Interurban Company, Tecumseh, Okla., J. W. Saxon, president, has completed plans for the immediate begininng of the work of construction of an electric interurban railway, including power house, etc. A. B. Coryell is engineer.

The State Board of Public Affairs of Oklahoma has completed plans for the construction at Paul's Valley, Okla., of a boys' training school, to be equipped with power plant, heating plant, electric plant, etc.

The city of Billings, Okla., has plans for the construction of a waterworks plant to cost about $7500.

A waterworks plant to cost about $25,000 has been decided upon by the city of Jennings, Okla. The mayor is in charge.

J. S. Cosden of the Southwestern Refining Company, Tulsa, Okla., announces that the refinery planned by the company will involve an investment of about $500,000 and will have a capacity of 6000 bbls. per day.

The public lighting commissioners of Watonga, Okla., have completed plans for the installation of a Corliss engine, a motor-driven pump and other equipment to cost about $35,000.

The Tulsa Corporation, Tulsa, Okla., is planning an increase of its electric plant capacity under the direction of Sargent & Lundy, engineers, Chicago.

The Southern Oklahoma Light & Power Company, Grandfield, Okla., will install equipment to cost about $5000. Lee E. Edwards is engineer.

The Tupelo Fertilizer Factory, Tupelo, Miss., will establish a plant at Corinth. Electric equipment, mixing and bagging machinery will be required.

The Laurel Planing Mill Company, Laurel, Miss., has been incorporated with a capital stock of $40,000 by W. M., R. E. and Charles Carter and T. Williams and will equip a planing mill plant.

The Priscilla Mills, Meridian, Miss., has plans for the enlargement of its plant for the manufacture of hosiery.

The W. G. Ragley Lumber Company, De Ridder, La., recently incorporated by W. G. Ragley of Ragley, Tex., and S. H. Fullerton of St. Louis, is in the market for equipment for a circular gang mill of 100,000 ft. daily capacity.

H. & C. Newman of New Orleans, La., have plans for a large warehouse in which they will install cotton compress equipment.

The Electric Mfg. & Specialty Company, New Orleans, La., has been incorporated with a capital stock of $50,000 by W. P. Conery, L. C. Reed and Victor Hoover to manufacture electric and other appliances.

Texas

AUSTIN, TEXAS, October 11, 1913.

The machinery and tool trade has been dull the past week. In central and south Texas almost unprecedented flood conditions prevailed for several days, interfering with railroad traffic and doing great damage to many towns by overflows.

It is announced that the Kansas City, Mexico & Orient and the Southern Pacific railways will jointly build large car shops at Alpine.

Plans are under consideration at Stockdale for the construction of a waterworks plant.

The machine and carpenter shops of the Magnolia Petroleum Company at Beaumont, recently destroyed by fire with a loss of $50,000, will be immediately rebuilt on a much larger scale.

T. J. Driscoll and associates have applied to the City Council of Hillsboro for a franchise to construct a natural gas distributing system there. The fuel will be piped from the Mexia field at an estimated cost of about $75,000.

The Colorado Electric Light & Power Company has sold its electric light and other holdings at Colorado to the Texas Power & Light Company, of Dallas, which will improve the plant and extend the lighting system.

The Irish Bayou Lumber Company, having a capital stock of $60,000, will construct a lumber mill at Sturgis. S. W. Henderson, of Houston, is interested.

The Planters' Cotton Oil Company has been organized with a capital stock of $100,000 at Dallas, to manufacture cottonseed oil. E. L. Flippen is interested.

Bonds in the sum of $32,000 have just been issued by the city of Denison for the purpose of installing additional machinery and making other improvements to the municipal water works plant.

The Waxahachie Ice Works will install new machinery and double the capacity of its ice plant at Waxahachie.

Under the direction of the Young Men's Booster Club of Abilene many farmers of that section will install irrigation pumping plants. One plant to each 10 to 200 acres will be constructed. Contracts have already been made for irrigating 1000 acres in this manner. Mark E. Ragsdale, engineer, is in charge of the work for the club.

The Crystal Ice Company will install additional machinery and equipment in its ice and cold storage plant at Sulphur Springs.

The Ray Ice & Cold Storage Company, of Ray, Ariz., will construct an ice plant at Superior, Ariz.

The Arizona Copper-Gold Mines Company, which has its principal office at Milwaukee, Wis., will construct two cyanide plants at its mines in the Prescott district of Arizona.

Phelps, Dodge & Co. will erect a large ore mill near Tyrone, N. M.

T. C. Hill and W. H. Hill will construct an ore reduction mill at their mine near Prescott, Ariz.

The Nacozari Consolidated Copper Company will construct a 100-ton concentrating plant at its mine near Nacozari, Sonora, Mexico.

The Pacific Coast

PORTLAND, ORE., October 7, 1913.

Machine tool dealers are taking considerable interest in the Government list for the Puget Sound Navy Yard, and expect to secure a good volume of business during the next year in connection with improvements to that plant. Otherwise most of the business in sight is of the usual small nature. On the whole, however, the demand is satisfactory. Sawmill and logging machinery is not moving as well as was expected, as production is greatly curtailed, and from present market conditions there is little incentive to increase the scale of operations. Some new equipment in these lines, however, is constantly needed. The demand for miscellaneous machinery has kept up fairly well, and good business is expected before the beginning of winter. There have been numerous inquiries from the interior for flour milling and grain handling machinery. Local export business is much heavier than last year, and building is more active than for some time, with a large amount of public improvement work under way.

It is reported that arrangements have been completed between the Northwest Harvester Company, Spokane, Wash., and the Holt Mfg. Company, Stockton, Cal., by which Holt harvesting machines for the north Pacific states and western Canada will be manu-

factured by the Spokane plant. This will probably require important additions to the plant.

The Prairie City Flouring Mills, Prairie City, Ore., are preparing to rebuild their flour and feed mill, and will operate the new plant by electricity.

The Brown & Kunze Company plans to build a sawmill at Arlington, Wash., with a steam turbine power plant of about 750 hp.

The plant of the Pacific Board & Paper Company, Seattle, Wash., operated under lease to the Boxboard Company, was entirely destroyed by fire recently. The mill was valued at $150,000, with about $80,000 insurance. Arrangements will probably be made to rebuild at an early date.

J. F. Wells, of Seattle, Wash., designer of a retort for use in fish canneries, has closed a contract with the Bayside Iron Works, Everett, Wash., to construct the machines.

Construction has been started on a new flour mill at Cambridge, Ida., by W. Klinger, Jos. Madison and C. E. Flenner. Electric power will be used.

The Rutledge Lumber Company plans to build a new mill at Cœur d'Alene, Ida., this fall. The proposed capacity is 500,000 ft. daily.

The Michigan Lumber Company has closed negotiations for the construction of a large mill near St. Maries, Ida.

Arrangements are being made for the installation of a smelter to handle the output of the Curtz mine at Loope, Nev.

The United Comstock Pumping Association, Virginia City, Nev., has received the first of its two 1000-gal. per min. pumps, which will be used to unwater the old Consolidated Virginia winze at the 2500-ft. level.

Arrangements are being made for the construction of a new public wharf at Hilo, T. H., equipped with sugar conveying machinery at an estimated cost of $18,640.

Eastern Canada

TORONTO, ONT., October 11, 1913.

The Lord & Burnham Company, which has factories in Irvington-on-the-Hudson, N. Y., and Des Plaines, Ill., will erect a Canadian branch factory at St. Catharines, Ont., to cost $75,000 for the manufacture of steel green houses and equipment, including boilers. The company will have its Canadian plant in operation not later than January 1, 1915.

The Malleable Iron Works will establish a plant at Midland, Ont. A by-law was passed to loan the company $60,000.

The Avon Hosiery Company, Stratford, Ont., will treble the size of its plant, and a new factory building, 60 x 95 ft., four stories, will be erected.

The Michigan Central Railroad will build a large pumping station at Tilbury, Ont., to supply the town with water.

The Burlington Windsor Blanket Company, Ltd., of Windsor, Ont., will locate in Toronto.

The Argus Fire Alarm Company, Montreal, is building a new factory which will cost $100,000.

R. C. Harris, works commissioner, Toronto, has informed the Board of Control that two 20,000,000-gal. pumps and two 7,500,000-gal. pumps, with steam engines, boilers and coal and ash handling plant, are needed to carry out the plans to reduce the peak load on the hydroelectric system. The board authorized Mr. Harris to prepare specifications and to call for tenders for the new equipment, and for the work of rearranging the existing plant.

Plans for a boiler shop have been filed by the John Inglis Company, Ltd., Toronto, providing for a one-story building containing 24,000 sq. ft. of floor space, to cost $100,000.

The Tallman Brass & Metal Company, Hamilton, Ont., has purchased the plant and machinery of Lomas & Nelson, art metal and electric fixture manufacturers, and will make electric fixtures from original designs.

The sawmill belonging to the MacLaren Company, Bout De L'Isle, Que., was recently destroyed by fire. The loss amounted to $50,000. The company will rebuild.

The Ferland Bros.' sash and door factory at L'Epiphanie, Que., was destroyed by fire. The loss is $25,000. The owners will rebuild.

W. & J. W. Greey, Toronto, will build an addition to their foundry.

F. Gilbert, Montreal, is having plans drawn for a new glove factory.

The Canadian Auto Top Company, Tilbury, Ont., contemplates the erection of a $20,000 plant.

The Sarnia Jam Factory Company, Sarnia, Ont., will build an addition to its plant.

A by-law granting the Goderich Organ Company a fixed assessment for ten years was carried by the rate payers of Goderich, Ont. The company has some important extensions to its plant in contemplation.

Walter G. Rumpel will erect a large felt factory at Berlin, Ont.

The National Forging Company, Chatham, Ont., having a capital stock of $100,000, will take over the plant known as the Swift Motor Car Company and will make automobile and carriage forgings as well as sockets. It is expected that work will be started shortly in rearranging some of the parts of the building and in the making of special machinery for the operation of the plant.

Robertson & Co., Toronto, have secured a permit to erect a four-story brick factory on Balmuto street, near Charles, to cost $40,000.

The Reiley Mfg. Company and the Victoria Twine & Paper Company, 443 King street West, Toronto, were damaged by fire to the amount of $25,000, covered by insurance.

The plant of the Eastern Car Company, New Glasgow, N. S., may now be said to be practically completed, although some machinery is yet to be placed in the foundry. From seven to nine steel under-frame freight cars are being turned out daily.

The Canadian Northern Railway has placed with the Canadian General Electric Company, Ltd., Montreal, an order for the complete electrification of its tunnel on Dorchester street, in Montreal. The contract, which amounts to $500,000, includes seven locomotives, multiple unit cars, generators, switchboards and other auxiliary apparatus.

The Kelly-Springfield Tire Company, Ltd., Montreal, has been incorporated with a capital stock of $5000 by W. R. Hastings, Robertson Fleet and others to manufacture rubber tires.

The Cheticamp Gypsum & Plaster Company, Ltd., Montreal, has been incorporated with a capital stock of $1,500,000 by C. H. Cahan, J. L. Finlay and others.

Cadillac Motors, Ltd., Montreal, has been incorporated with a capital stock of $50,000 by F. G. Bush, H. W. Jackson and others to manufacture automobiles.

Wailes Dove, Ltd., Montreal, has been incorporated with a capital stock of $50,000 by A. W. Holmested, C. J. F. Collier and others to manufacture enamel, paint, white lead, etc.

The Canadian Carter Company, Ltd., Ottawa, Ont., has been incorporated with a capital stock of $150,000 by J. B. Carter, C. A. Denneen and others to build railroads, canals, tunnels, etc.

M. J. O'Brien, Renfrew, Ont., is contemplating building a factory for the manufacture of mining tools and equipment at Ottawa, Ont.

Western Canada

WINNIPEG, October 11, 1913.

Local machinery firms report business this week in a little larger volume than in preceding weeks, comparing favorably with trade at the corresponding period of last year. Managers of leading houses predict a steady increase hereafter. The industrial situation generally appears to be on a healthy basis. The Winnipeg Industrial Bureau is receiving numerous inquiries from manufacturers in the East and South as to opportunities for locating factories in this part of Canada. The financial situation is gradually improving in western Canada, chiefly owing to the satisfactory progress that has been made to date in marketing the largest crop in the history of the country.

Bids will be received until October 25 by E. W. Bull, superintendent of the light and power department, Regina, Sask., for a 3000 kw. steam turbine with condenser, and for a 25-ton hand-power crane.

E. H. Briggs & Co., Ltd., manufacturers of brooms, etc., Winnipeg, have applied for authority to increase their capital stock from $40,000 to $200,000. It is the intention to greatly add to the capacity of the plant.

The Upper Fraser Lumber Company, Ltd., is erecting a lumber mill at Dane Creek on the Fraser River, B. C. It will have a capacity of 100,000 ft. per day. A. H. Edwards is manager.

The Northwest Biscuit Company, Ltd., recently organized in Edmonton, Alberta, is building a factory.

The Council of Assiniboia, Manitoba, has decided to raise money with which to construct waterworks and sewer systems as soon as possible. Specifications are now being prepared with a view to advertising for tenders.

The Canadian Northern Railway will build a modern car repair plant at Port Arthur, Ont., in connection with its local terminals next summer, to cost $30,000.

The Port Arthur Wagon Works, Port Arthur, Ont., will add a foundry and machine shop for the manufacture of wagon hardware. The building and equipment will cost $5000.

The British Columbia Transport Company, Ltd., Pitt Lake, B. C., will expend $100,000 for a rock crushing plant and other improvements.

The Alberta Rolling Mills, Ltd., Medicine Hat, Alberta, is planning an extension to the plant.

The Grand Trunk Pacific Railway will spend $26,500 on motors and electrical apparatus for the shops at Transcona, Manitoba.

The Canadian Pacific Railway Company is preparing to establish an extensive creosoting plant in connection with its lumber mill at Bull River, B. C. The water power at this point will also be developed.

J. H. Maddaugh is erecting a small shingle mill at Yarrow, Vedder Lake, B. C. The plant will use steam power.

Foley, Welsh & Stewart, railroad contractors, Vancouver, will erect a sawmill 14 miles north of Newport, B. C. They contemplate building another mill in the Lillooet district, B. C.

The Crow's Nest Pass Lumber Company, Ltd., Wardner, B. C., is erecting a planing mill, replacing the one which burned this summer. D. C. Patmore, Spokane, is architect.

It is understood that the recent incorporation of the Everett Pulp & Paper Company, Everett, Wash., will mean the erection of another big pulp mill in British Columbia in the near future. The capital of the company is now $670,000.

Plans for the plant of the Conley Frog & Switch Company, Fort William, Ont., have been received at the office of G. R. Duncan & Co., Victoria avenue, Toronto. Tenders will be called for in the course of a few days. It is the intention of the company to have its works in operation by next May.

A boot and shoe factory will be erected at Regina, Sask., by the W. G. Downing Company, to cost $55,000.

Government Purchases

WASHINGTON, D. C., October 9, 1913.

Bids will be received by the Bureau of Supplies and Accounts, Navy Department, Washington, until October 28, under schedule 5924, for a grinding machine for Boston; under schedule 5929, for a check valve, flanged gate valve, water relief valve, and double gate valves for Key West; under schedule 5937, for double-service blocks for Brooklyn and for worm-geared blocks for Norfolk; and until November 11, under schedule 5940, for portable electric welding apparatus for Mare Island.

Bids will be received at the office of the United States Reclamation Service, Boise, Idaho, until October 25 for dredging equipment to be used at the new Jackson Lake dam at Moran, Wyo. A. P. Davis, acting director, United States Reclamation Service, Department of the Interior, Washington, may be addressed.

Bids will be received at the Bureau of Yards and Docks, Navy Department, Washington, until November 8 for one 100-kw. motor-generator set and switchboard accessories for the naval station, Pearl Harbor, Hawaii.

Bids will be received at the Bureau of Yards and Docks, Navy Department, Washington, until November 8 for one 100-kw. motor-generator set, with a 3-panel switchboard, 60-cycle, 2200-volt, with not less than 150-hp. capacity, mounted on the same bed plate and direct connected to a 100-ky., 230-250-volt compound-wound, direct-current generator.

Bids were received by the general purchasing officer of the Isthmian Canal Commission, Washington, on October 4 for supplies as follows:

Class 19, 18 portable forges—D. H. Potts, $198, 30 days; Universal Trading Company, $233.64, 45 days; William E. Williams, $287.28, 36 days; George S. Fowler, $210.60, 30 days.

Bids were received at the Bureau of Supplies and Accounts, Navy Department, Washington, on October 7 for supplies for the navy yards as follows:

Schedule 5847—Construction and Repair.

Class 24, Brooklyn—One electrically-driven, non-reversible, light, portable winch—American Engineering Company, $1648; the Hyde Windlass Company, $1440; Lidgerwood Mfg. Company, $2107 and $2983; J. S. Mundy Engineering Works, $1500.

Class 24, Alternate—Inspection at the point of delivery—Lidgerwood Mfg. Company, $2107 and $2983; J. S. Mundy Engineering Works, $1500.

Schedule 5848—Construction and Repair.

Class 25, New York—Furnishing and erecting one traveling crane in a building. Brown Hoisting Machinery Company, $1030; Hoisting Machinery Company, $1200; Johnson & Jennings Company, $1560; Pawling & Harnischfeger, $950; Sprague Electric Works, $1400.

Schedule 5831—Steam Engineering.

Class 1, Puget Sound—One vertical simplex, double-acting, steam-driven pump—Blake-Knowles Steam Pump Works, $622 and $670; M. T. Davidson Company, $390; Dow Pump & Diesel Engine Company, $435; Ingersoll-Rand Company, informal; Warren Steam Pump Company, $499.

Bids were received October 6 by the general purchasing officer, Isthmian Canal Commission, Washington, under circular 796, for material for the Ancon and Miraflores pumping station as follows:

The bids were submitted under one class, divided into separate items, as follows:

Item 1—14 centrifugal pumps with electric motors and compensators.

Bid 1—Blackall & Baldwin, $29,000, 165 days; using Kingsford pump and General Electric motor.

Bid 4—Camden Iron Works, $40,120, 200 days; Camden pumps and Allis-Chalmers motors.

Bid 5—A. S. Cameron Steam Pump Works, $29,090, 165 days; Cameron pumps and General Electric motors.

Bid 8—De Laval Steam Turbine Company, $43,500, 180 days; own pumps and General Electric motors. For mark 501, 2-stage pumps, deduct $300, and for mark 502, double suction pumps, deduct $2500.

Bid 9—Kemp Machinery Company, item 1, $40,000, time 176 days; Byron Jackson Iron Works pumps.

Bid 13. Janesville Iron Works, prices for each mark separate, mark 501, $6304 and $6004; mark 502, $7791 and $7641; mark 615, $2455 and $2140; mark 564, $9171, $8178, and $8028; mark 565, $6882, $5922, and $5972; mark 571, $526; mark 592, $540; own pumps. General Electric motors; 192 days.

Bid 15—Manistee Iron Works, $31,210, 165 days; own pumps and General Electric motors.

Bid 20—Alberger Pump & Condenser Company, $37,755, $34,670, and $33,580; own pumps; General Electric motors; 165 days.

Item 4—One air compressor, complete, with motor and air receiver.

Bid 3—Bury Compressor Company, $3192 for compressor with poppet valve or $3292 as specified; ship 16 weeks; own make.

Bid 12—Ingersoll-Rand Company, $3200, 175 days; own make.

Bid 20—Alberger Pump & Condenser Company, $4220, 165 days; American Compressor Company make.

Janesville Iron Works, $3108, Clayton manufacture, or $3300, Laidlaw-Dunn-Gordon manufacture, 177 days.

Item 6—Three 6-ton hand-operated traveling cranes.

Bid 2—Brown Hoisting Machinery Company, $2445, 80 days; own make.

Bid 6—Chisholm & Moore Mfg. Company, $1900, 45 days.

Bid 7—Cyclops Iron Works, $2595, 50 days; own make.

Bid 10—Manning, Maxwell & Moore, $1977, 100 days; Maris manufacture.

Bid 16—Niles-Bement-Pond Company, $4015, 90 days; Niles Crane Works manufacture.

Bid 20—Alberger Pump & Condenser Company, $2265, Maris, or $4815, Niles-Bement-Pond, 165 days.

Coal Handling Plants at Panama Canal Termini

The coal handling plants to be installed at Cristobal and Balboa, Canal Zone, will have two water fronts and a storage pile. The space along water fronts will be used as the unloading and reloading wharf, while the storage pile will consist of a basin filled with coal, a portion of which is to be stored subaqueously, with the remainder piled above it. Each plant will be arranged to handle coal belonging to individuals and companies, as well as to the Government. The coal will be received at each plant by movable unloading towers running on rails on the unloading wharf and reloaded to colliers and barges by movable reloaders on rails on the reloading wharf, and all operations will be performed by steam engines. The unloading towers at the two plants are to be similar in general construction and will have a normal rated capacity of 250 tons per hr., with a maximum of 300 tons when unloading from colliers or barges. Each tower, equipped for steam operation, will be supported by four 4-wheel trucks, traveling at a minimum rate of 50 ft. per min. The towers will be equipped with buckets of 100 cu. ft. capacity, and a 50-ton receiving hopper. The wharf bunkers having a capacity of 1500 tons of coal will be provided at each plant, with two discharge valves. The capacity of the Cristobal plant is figured at 300,000 tons, and that at Balboa is 210,000 tons. The contract as recently noted was given to the Hunt Construction Company, New York City, and Augustus W. Smith, Bayonne, N. J.

The new foundry building which the Otis Elevator Company is adding to its plant at Buffalo, N. Y., is nearly completed and ready for the installation of equipment. It is 120 x 423 ft. One of the features of this foundry will be an electric steel furnace, having a capacity of 12 tons per day, for making high grade steel castings.

A drydock and shipbuilding plant will be erected at Sault Ste. Marie, Ont., Canada, to cost about $2,000,000. The construction of the plant is to start not later than April 1, 1914. The contractors will be Sir Douglas Fox & Co., of England.